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SEPTEMBER, 1900

VOL. XVI. NO. 3.

The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

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The
Geographical Journal.

No. 3. SEPTEMBER, 1900. Vol. XVI.

STUDIES IN THE ANTHROPOGEOGRAPHY OF BRITISH NEW GUINEA.

By Prof. ALFRED C. HADDON, Sc.D., F.R.S.

These fragmentary studies on the relation of certain native tribes to their environment are mainly the result of observations made and information collected during the Cambridge Anthropological Expedition to Torres Straits and New Guinea in 1898. Although I am fully aware that they are very imperfect, I have not hesitated to publish these notes, as I think it desirable to call the attention of residents in British New Guinea to the advisability of studying the natives from a broad point of view.

Those who come into contact with varied tribes with different customs and arts and crafts are apt to be somewhat bewildered by the details, and can scarcely "see the wood for the trees." The tribal feuds, too, are often complicated, and have few redeeming features, marked as they are by indiscriminate bloodshed and variable bravery. It appears to me, however, that there is something at the back of all this, if we could only find it out. It looks as if there were slow driftings of various elements in the population along definite lines. This requires investigation and the reasons for these movements should be explained. The vendetta is almost invariably referred to as the cause of tribal war, but there may be other factors besides this.

The direct effect of the country and climate on the people is worthy of consideration, and especially should the fertility of the soil, abundance, or the reverse, of vegetable and animal food, and similar points be noted, as they have far-reaching effects on the people, not only as regards physique, health, fertility, and the like, but also as regards the life of the family and the social organization. For the elucidation of all these

it needs accurate local knowledge, such as resident Government officials, missionaries, and others must possess. If this paper could induce such to put their information into permanent form, I should be well satisfied. I am perfectly aware what many missionaries and Government officials have done to advance our knowledge, but much more remains to be done, and we want more grouping of facts and a deeper knowledge of the motives for actions and of the meaning of ceremonies. I am also perfectly aware that this entails much drudgery, fatiguing work, under very unfavourable conditions, the exercise of considerable patience in collecting and sifting evidence, and, finally, that there will be no reward, save in the satisfaction of advancing knowledge and the preserving of information for future ages that would otherwise be lost to mankind; for it cannot be too often or emphatically reiterated that now is the time to collect and record—soon it will be too late.

After making a few general remarks on the structure of the country and the appearance of the people, I deal in more detail with three distinct regions of British New Guinea. These are the Mekeo district, part of the Central district, and part of the Rigo district. The latter part of the paper gives a summary of our knowledge concerning the geographical distribution of the cephalic index, and of certain selected customs, arts, and crafts, and the bearing of these facts is discussed.

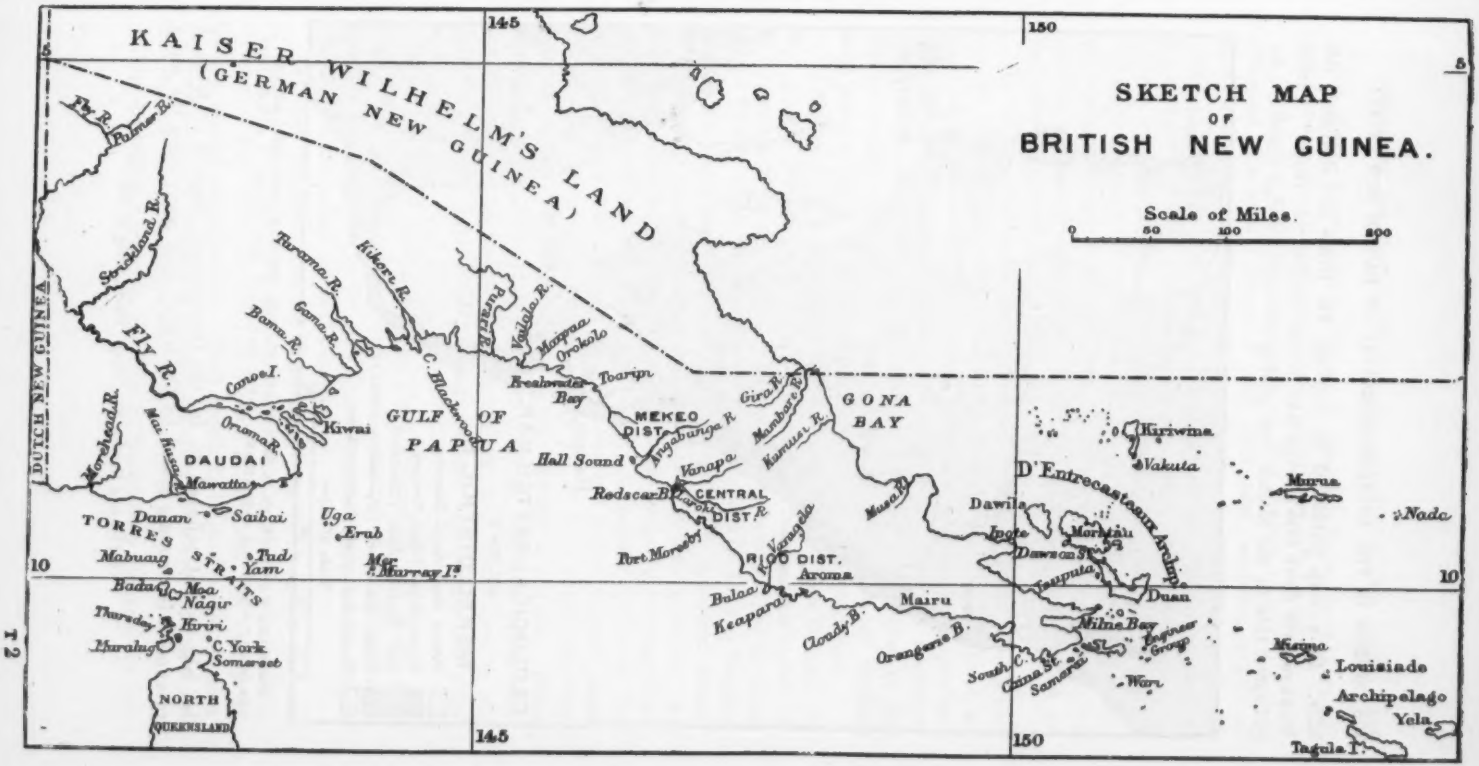
General Structure of British New Guinea.

The backbone of British New Guinea consists of a long range or series of ranges of mountains running north-west—south-east. The southerly extremity is submerged, and constitutes the Louisiade archipelago; the northerly end passes into the Blücher and Victor Emmanuel mountains, and is continued in a more westerly direction through Netherlands New Guinea to the extreme end of this largest of all islands. Other mountain ranges radiate into Kaiser Wilhelms Land.

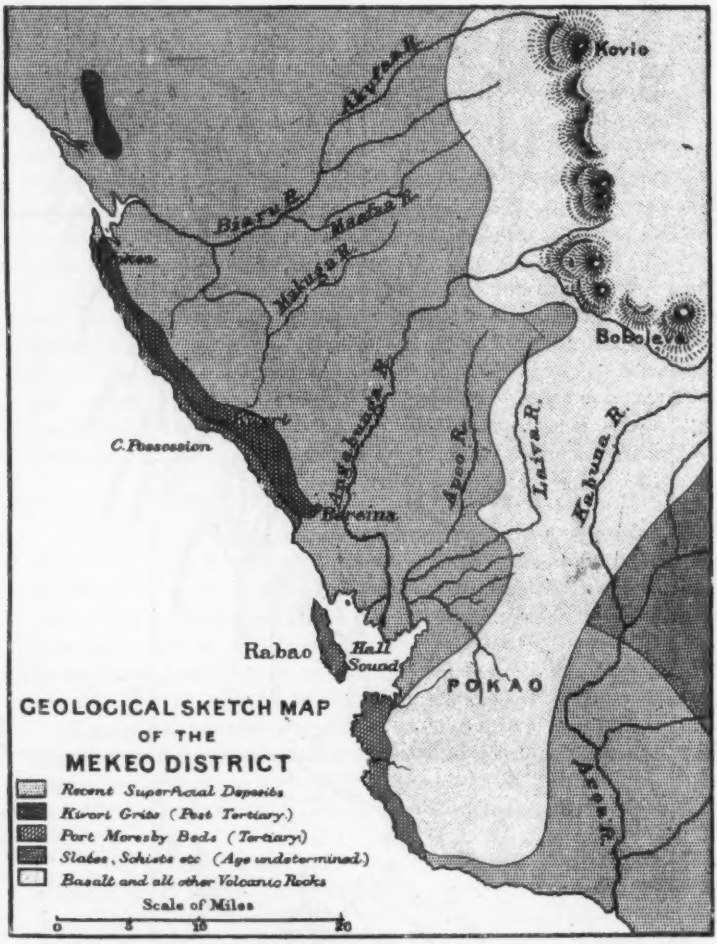
The central mountains appear to be composed of crystalline schists of undetermined age, with slates and gneiss. Flanking these in many places are large areas composed of igneous rocks, such as basalt, ashes, and other volcanic rocks. These constitute broken mountainous and hilly country.

In the Mekeo district there is a narrow coastal band of Tertiary greenish sandy shales, limestones, and calcareo-siliceous beds, which are known as the Port Moresby beds. These form a broader coastal band from Redscar bay to Round head, where they extend into the interior as far as the central schists. As a rule these beds form a broken hilly country, with some mountains of no great height.

Also in the Mekeo district, from Jokea to Bereina, there is a linear outcrop of Post-Tertiary grits, sandstones, and conglomerates known as the Kivori grits, which runs parallel to and alongside of the Port Moresby beds of this district. They form the low range of the Kivori


SKETCH MAP
OF
BRITISH NEW GUINEA.
Scale of Miles.
0 50 100 200
KAISER WILHELM'S LAND
(GERMAN NEW GUINEA)
DUTCH NEW GUINEA
145
150
5
10
Fly R.
Palmer R.
Strickland R.
Turama R.
Kikori R.
Bamu R.
Gama R.
Fly R.
Conoe I.
C. Blackwood
Horsfield R.
Mai Kussa
Oroma R.
DAUDAI
Kiwai
GULF OF PAPUA
Mawatta
Daru
TORRES STRAITS
Saibai
Uga
Erub
Mabuag
Tud
Yam
Mer
Murray Is.
Boda
Moa
Nagir
Thursday I.
Kiriri
Muralag
C. York
Somerset
NORTH QUEENSLAND
Purari R.
Vailala R.
Maipa
Orokolo
Bealander Bay
Toaripi
MEKEO DIST.
Angabunga R.
Hall Sound
Vanapa
Redscar B.
CENTRAL DIST.
Port Moresby
ROKO DIST.
Aroma
Gira R.
Mambare R.
Kumusi R.
GONA BAY
Musa R.
Dawila
Ingote
Dawson St.
Teupula
Balaa
Keapara
Mairu
Cloudy B.
Orangerie B.
South C.
China St.
Samarai
Kiriwina
Vakuta
D'Entrecasteaux Archipelago
Murua
Nada
Morkau
Duau
Milne Bay
Trobriand Group
Misima
Louisiade Archipelago
Yela
Tagula I.
War

hills. In a map published by Fathers De Rijke and Jullien,* the Makuga river flows into a large lake, which is called "L. Inapi." I have indicated this in the sketch and geological maps of this district. As



FROM THE MAP MADE BY A. GIBB MAITLAND, ESQ., ASSISTANT GEOLOGIST OF THE GEOLOGICAL SURVEY OF QUEENSLAND. ANN. REPT. BRIT. NEW GUINEA, C.A. 106, 1892.

the lake is not referred to in the Government Reports or maps, I presume it is a morass caused by the Kivori hills preventing the water

* *Comptes Rendus Soc. Geogr. Paris*, 1898, p. 206.

of the Makuga from gaining access to the sea. Probably it is full of water in the rainy season, and then may fairly be called a lake.

Taking the south-east peninsula of New Guinea as a whole, it is composed of a central range of lofty mountains consisting largely of slates and schists, which, so far as is known, have an east-north-east strike. The less lofty lateral mountains, which form occasional *massives*, are composed of acid and basic volcanic rocks, of which the former appear to predominate. To the east these mountains are bounded by contorted Tertiary beds that form a tumultuous hilly country, which extends to the coast-line. Most of the mountains and hills appear to be built up of contorted or much-tilted beds, and may be described as well-dissected folded mountain ranges.

But few extensive alluvial plains occur in the peninsula. The lower reaches of the Laroki and Vanapa rivers and the basin of the Aroa constitute a very fertile plain inhabited by the well-to-do, independent Kabadi tribe, who do a great trade with the Motu potters in exchange for all kinds of native food. The largest of these plains is found in the Mekeo district, and here the natives seem to have advanced further from savagery in several respects than elsewhere on the mainland.

When we turn to the western division of British New Guinea, we find quite a different state of affairs; nothing, however, is known of the greater part of the district. At the German boundary, at the head of the Palmer river, an important affluent of the Fly, are the Blücher mountains, which are about 6000 feet in height; the Donaldson mountains are only about 2000 feet, and are wooded to their summits. At the base of these mountains is a flat alluvial plateau, with low sandstone and limestone hills about 100 to 150 feet in height. South of lat. 5° 45′ S. there are forested steep hills about 500 feet in height; about the junction of the Palmer with the Fly (lat. 5° 54′ S.), the hills vary from about 350 to 400 feet; at 6° 5′ S. they are 200 to 300 feet. From D'Albertis junction (6° 11′ S.) to about 7° 3′ S., the river-banks vary from 2 yards to 50 feet, but no hills are recorded. From here to the coast is lowlying land, usually densely covered with jungle and often swampy.

This enormous wooded alluvial plain, watered by the Bamu, Fly, Mai Kussa, and Morehead rivers, not counting their affluents and minor rivers, is said to be very sparsely inhabited, and we know extremely little indeed about the natives.

Between the Bamu and the Lakekamu river, which enters the sea at Toaripi, in Freshwater bay, are the Turama, the intricate delta systems of the Omati, Kikori (Aird), and Purari, and the Vailala or Bailala, besides smaller rivers. They appear to be well populated, and there are large and important villages all along the coast inhabited by thriving and energetic people who have plenty of food.

The Australian Cordillera can now be traced from Tasmania in the

south, along the eastern margin of Australia, through the western islands of Torres straits, into Mabudauan hill in Daudai. The eastern islands of Torres straits, Erub, Uga, and the Murray islands, by the recent nature of their volcanic rocks, all of a basic type, belong to a line of later movements.

The Papuans.

The inhabitants of New Guinea belong to that division of mankind which is termed Melanesian, or the dark-skinned, black frizzly-haired people of the Western Pacific.

WAVY-HAIRED BOY, SINAUGOLO, EIGO DISTRICT.

The majority of the natives of British New Guinea are of a rich or dark-bronze colour, but it varies from a brown, that might be called black, to a yellowish brown. The darkest people are confined to the Gulf, the Fly estuary, and Torres straits. Inland tribes at the British-German boundary at the centre of the island are of a light bronze. The tribes on the Morehead, on the upper Purari, and those near Kovio (Mount Yule) are much the same colour as the dark brown of Port

Moresby, and the natives of the central range have about the same colour.

Taken as a people they are remarkably smooth-skinned, hairy individuals being uncommon. Straight or wavy haired individuals are not infrequent in the central and eastern districts and in the islands beyond. In them the hair is often lighter in colour. As many as five per cent. of straight-haired people have been counted at public meetings from the central districts as far east as Gawa, one of the Bennet islands (Kiriwina, Murua, etc.). Sir William Macgregor says, "It has always struck me that the Kiriwina people more nearly resemble the Line Islander* than any other tribe in this part of the world. They have the same mental characteristics, including a tendency to suicide. At Kiriwina, among twenty or thirty boys, there will always be two or three with wavy black hair, which is decidedly not frizzly."† The hair is invariably frizzly among the mountaineers of the central range, and throughout the whole of the western district from the Gulf to the German and Dutch boundaries, and in the islands of Torres straits.

An extremely good general account of the natives is given by Sir William Macgregor in his little book, 'British New Guinea: Country and People' (1897), from which I have not hesitated to borrow facts concerning places I did not myself visit.

Notes on the Mekeo District.

In my memoir on 'The Decorative Art of British New Guinea,' I have alluded to the fact that the district between Cape Possession and Hall sound is inhabited by a mixed population, for, in addition to what may be regarded as the indigenous population of the Mekeo district, we find that Gulf natives have migrated from the west, and that Hall sound is the most westerly limit of the immigrant Motu people.

West of Cape Possession are four villages, Kaima, or Oikapu (sometimes called Waikapu, Woikabu, or Oiabu), Jokea, Biaru, and Lese.

The Oikapu are a bush people, who more than three generations ago, under a chief named Haisafarui, came down to the coast and obtained such success against the Toaripi that the latter left them in possession of their present land.

The Jokea and Biaru folk were originally known as Moaripi, and lived on the banks of the Biaru, probably not at its mouth, but within easy reach of the sea. Their language was distinct, and is said to be exceptionally difficult, and is known now to only a few old men. A long time ago, owing to a scarcity of women, considerable intermarriage took place with the Toaripi women, and as a result the Moaripi became a large and powerful tribe, and the men adopted the language of their

* Presumably Sir William refers to the Gilbert group in Micronesia.

† 'Annual Report on British New Guinea,' C.A. 6, 1898, p. 38.

Toaripi wives. They encroached on the land of the Lepu or Sipoi tribe, who lived at Oikapu. This led to continual fighting with varying success, but it would appear that the Moaripi were finally victorious, as

the present site of Jokea was originally Sipoi territory. Jokea was the result of a peaceful split from Biaru.

Sir William Macgregor says * the Jokea and Biaru natives "are of

* 'Annual Report on British New Guinea,' C.A. 35, 1894, p. 18.

the Freshwater bay type—tall men, with long muscular limbs, loosely built, rather dark in colour, with straight, prominent noses. The head is, as a whole, remarkably narrow, the temper impulsive and quick." At Apanaipi, 14 miles up the Biaru river, and at Aipea, a dozen miles further up, the people seem to be of the Mekeo stock. Macgregor records an amusing incident which illustrates the difference in character between the Toaripi type of native and his near neighbour of Mekeo. A family chief of Biaru brought a small pig to present to him, but on the Governor's arrival he began to think it was too little for such a purpose. He put forward another man to say that he was ashamed of the small size of his present, and would not offer it to him, but would go home and fetch a larger one, which he did. The Mekeo man would have presented the little one, if he could not obtain a less.

At the mouth of the Lakekamu (Williams river), beyond Lese, is the important village of Toaripi. The Toaripi are a split from Evara, or Moviavi, which is situated 8 miles from the coast. The migration took place more than a century ago. It is stated that some forty years ago the village site became insanitary, and there was an epidemic of sore legs. Their Motu friends, with whom they trade, persuaded the people to go east, and for a few months they settled at Pari, which is just beyond Port Moresby; but becoming tired of this, they returned to their present village site.*

Father Cochard informed me that the Kaima (Oikapu), Jokea, Biaru, and Lese belong to the Hohoru tribe, who, like the Kivori, are very wild and warlike, and are different from the Toaripi. The latter, who are called Mohu Mohu by the Roro, and Motu Motu by the Port Moresby people, are stated by him to be more traders than warriors. On the other hand, the Rev. James Chalmers† describes the Toaripi as "the terror of all the other tribes from this to Keapara," but he includes under this name "all the Motu Motu villages, Moveave, Lese, and Iokea, and part of Karama." Formerly Chalmers spoke of this as the Elema tribe, which extends from "Oiabua to Orokolo."‡

There is evidence that the Gulf natives were extending in a south-easterly direction until their depredations were stopped by the arrival of the white man, one of their last acts of aggression being to burn the Roro village of Rapa.

East of Cape Possession is the large village of Waima (Maiva of most authors), but formerly there was no village at this spot. The Kivori lived near Cape Possession, and the Roro, Bereina, and Abiara lived on the other side of the hills. These four tribes used to meet at

* For the foregoing information about Oikapu, Moaripi, and Toaripi, I am indebted to my colleague Mr. C. G. Seligmann, who obtained it from the Rev. J. H. Holmes, L.M.S. missionary of Orokolo who was formerly stationed at Jokea.

† *Journ. Anthrop. Inst.*, xxvii., 1897, p. 326.

‡ 'Pioneering in New Guinea' (1887), p. 280.

a particular creek for barter; the Kivori began to build houses at this market-place, and the Abiara followed their example. Hence the double character of the village of Waima, which is further illustrated by the fact that when one of the two tribes has a feast in the village the other does not participate. Still further south-east are the small villages of Roropokina, Rorcaiera, and Arabukupuna. Their inhabitants are settlers from Kivori, and were therefore originally Gulf natives, if it is true, as I have been informed, that the Kivori came from further west, perhaps from Orokolo.

At the southern point of Hall sound is the village of Delena, the more correct name for which, I was informed, is Marihau. The founders of this village migrated from Port Moresby, and mainly occupied the slopes of the hill. These people are largely adherents of the London Missionary Society. A part of the village of Delena on the sand-beach is called Roro, and the inhabitants are said not to be so amenable to missionary influence.

The Roro originally inhabited Oriki, near Bereina, but they were driven away by the Bereina and Waima, and they settled at Ahara, on Rabao (Yule island), which was then uninhabited, and at Marihau (Delena). From Ahara the people migrated to Pinupaka, but they still bury their dead at Ahara. In order that the spirit of the dead may not be offended that the corpse is not buried at Pinupaka, the friends tell the dead body that it is not being buried in the bush, but in the village, and that they, the living, have left the village and gone into the bush.

To the south-east of Delena is the inland village of Oroi, usually called Nara. The people are essentially the same as the Pokao; they have the same kind of houses; they meet in feasts, and intermarry. There are two colonies from Waima, near Oroi: (1) at Nabuapaka—these were a branch of the Abiara tribe; and (2) at Biziu (Bitshiu, or Isiu). These villagers have the same language and customs as those of Waima. The Waima folk bought the latter site from the Kabadi people, and paid for it in native trade. The Rev. H. M. Dauncey informs me in 1891 there were very few houses there, but since 1894 the place has steadily grown by settlement of fresh Waima families.

There is not the same intercourse between the Marihau of Delena or other villages to the south-east, who are also of Motu descent, and the Mekeo peoples, as between the latter and the coastal population of the Papuan gulf. Proof of this is evidenced by the fact that the Kivori, Waima, and Roro know the Gulf villages and visit them for feasts, but they never go to feasts at Kabadi, Redscar bay, or Port Moresby. A few visitors come from Orio (Nara) or Pokao, to feast at Bereina or Waima.

There are three main groups of people in the region round Hall sound, which are distinguished by marked dialectic differences. These are the Roro, Mekeo, and Pokao.

Roro.

The Roro plant their villages on the sea-shore and along creeks. The men live as much in their canoes as on their infertile soil. These fishermen collect in large numbers at the fishing seasons at the mouths of the Angabunga, Apeo, and other rivers. The fish are carefully smoked, and are bartered for the fine taro and enormous sweet potatoes grown by the Mekeo women. According to the seasons with their prevailing winds, these adventurous and trafficking mariners visit the coastal tribes to the north-west or to the south-east. In the Papuan spring, October and November, they repair to Toaripi for sago, which grows in inexhaustible quantity in the neighbourhood of the great rivers. Here they exchange the thin pots of Ziria, the main village of Rabao (or Yule island), which are celebrated all along the coast, for bundles of sago, which are stacked in the bottom of the trading canoes, the latter being four or half-a-dozen canoes lashed together. In March or April, after the heavy rains, the annual visit is paid to the jewellers of Taurama and Pari, who excel in the manufacture of necklaces of small shells (*mobio* = *taotao* (Motu)) and of polished shell armlets (*ohèa* = *toea*, (Motu)).

The art of pottery-making was introduced into this district by immigrants of the Motu stock, who, as we have seen, have reached their furthest western limit at Delena. Not very long ago only one woman at Pinupaka had acquired this art, now all the women practise it, but the clay is obtained from Yule island.

These merchant fisher-folk have the reputation of being roguish and cajoling, and with a pretty conceit in flattery. When boats arrive they are greedy for news. They have been described as the Athenians of Papua. Their language compares favourably with the guttural tongue of the inland folk, being clear, musical, and distinct, with neither strain nor ridiculous contractions.

Mekeo.

The Mekeo group of people live mainly in the villages that cluster around the Angabunga (St. Joseph) river; there are also villages on the upper waters of the Biaru, and on the Apea, Laiva, and other streams that flow into Hall sound near the mouth of the Angabunga. They are an intelligent, interesting, and well-to-do set of natives, who present marked differences from their Gulf neighbours. There are two great divisions, the Vee and the Biofa. The prolific and skilful Biofa have devastated the villages of the Vee, and, according to the Sacred Heart missionaries,* they have also strengthened themselves by alliance with "the sea-warriors, Lokou and Motu-Motu" (Toaripi), in order to crush their rivals. Unfortunately, I have no further information to give

* Album des Missions de la Nouvelle-Guinée. Pèlerinage de Notre-Dame du Sacré-cœur, à Issoudun.

concerning these two factions, and it would be important to trace out the history and significance of this feud; it rather looks as if the Biofa were an immigrant tribe that was depossessing the indigenous Vee. I regret I cannot mention which are the Biofa and which are the Vee villages. It is, however, a matter of recent history that Eboa has attacked Inawabui, and later Inawaia followed their example; but these feuds have now been settled by the Government. Inawa, an offshoot from Inawaia, is (according to Macgregor) the smallest and fiercest tribe in this part of the district. The late Bishop Verjus urged the Inawaia and Eboa to cease their quarrelling, and prevailed on them to build a new village on the left bank of the Angabunga, in which the Vee and Biofa were to live amicably side by side. He named this village "The Peace of Jesus," *Jesu baibua*, or *Yeku ngangau*, according to two local dialects. The village is generally termed officially Yeku.

The Mekeo people are good agriculturists, and their rich soil yields them abundant harvests. Each of their villages consists of a single wide street, with houses on each side; sometimes the houses are two or three deep, but in this case they are not so arranged as to leave a regular street on each side of and parallel to the main street. There are usually two *mareas*, which are generally placed at opposite ends of the village. The *marea* is the club-house of the men; often it is highly decorated with carved and painted posts and boards and streamers of palm leaves. The *marea*, which is the equivalent of the *erabo* or *eramo* of the Gulf, the *kwod* of Torres straits, and the *dubu* of further east, is the centre of the social, political, and religious life of the men.

The Government has had very great difficulty in getting the people to bury their dead in a cemetery away from the village, as they preferred their old plan of burying under the houses. The people are greatly in dread of the sorcerers, who have the reputation for very powerful magic.

Pokao.

The inland district south of Hall sound is a dry hilly country, with sparse woods and green swards, where grow the aromatic plants so dearly prized for personal wear by the natives of the whole district. The physical conditions of this healthy land of eucalyptus and kangaroos do not appear to be favourable to agriculture, and so the inhabitants have become mainly hunters of the abundant game. On referring to the geological sketch-map, it will be seen that this is a region of old volcanic rocks.

The Pokao people are an instructive example of the economic defects of a hunting existence. The necessity for getting fresh food every day —for meat cannot be kept like yams or sago in this tropical climate— fosters improvidence. Hence these hunter-folk are too lazy to send their meat to market. If the Mekeo people will fetch the meat they

require, so much the better; if not, to use an expression employed nearer home, they "can't be bothered."

A hunting population, all the world over, is liable to periodic famines, and the Pokao people are no exception; but so ingrained is their laziness, or indifference, that they have been known to refuse to send for food which they could have had for nothing. They preferred to go hungry rather than take a monotonous tramp to obtain food.

Probably in no part of British New Guinea are markets so numerous as in the Mekeo district. As markets are important factors in the social evolution of a people, it would be well if some of the residents in this district were to make a special study of the origin and regulations of the various market-places.

Markets are held at Inawaia and Mohu every five days on the banks of the river, and at various intervals at Inawi, Inawa, and Jesu Baibua, to which the Bereina, Abiara, and Waima people come. During the crab and crayfish season in the north-west monsoon, these markets are also held every five days. Inawi and Inawa used to fight Bereina, and trouble consequently often arose in the villages on market days. To lessen this danger, the Government appointed a market to be held in the forest between Inawa and Bereina. Roro has no regular market, but there is a great market at the mouth of the little river of Oriki, near Abiara.

According to the physical features of the locality, the villages have a superfluity of some food, or have access to a speciality, or are experts in a handicraft; these naturally form the stock-in-trade. For example, the Roro of the coast from Pinupaka, Rabao (Yule island), Marihau (Delena), and even the villagers of Nabuapaka beyond Delena, trade crabs, crayfish, and mussels, as well as pottery for the taro, yams, sweet potatoes, sago, bananas, and areca nuts of the Mekeo tribes as far inland as Rarai, at the foot of Kovio (Mount Yule). Waima trade in coconuts; Waima, part of the Kivori, Bereina, and Babiko provide yams and some sago. If a big feast is approaching, the Mekeo people send for wallabies and cassowaries to the villages of the rich game district on the other side of Hall sound, such as Pokao, Boinamai, Nabuapaka, and Biziu. Even the Waima and Kivori and Bereina will send to Pokao for game, although wallabies are obtained in the grassy plains around Bereina; sometimes they get game from Kaima.

The natives of Rabao (Yule island) buy nose and arm and other shell ornaments from the Port Moresby villages, Pari, etc.; feather ornaments, gourds, and forks from Mekeo; petticoats from Kivori; and large bark belts from Toaripi.* The bows of the district are mainly manufactured at Kaima.

* I believe these are plain bark belts; the Toaripi men obtain the carved bark belts which they wear from Vailala and Orokolo.

Notes on the Central District.

In order to give a clear idea of the social condition of the inland tribes, I must briefly recapitulate the principal physical features of the country. The main range of mountains runs some 40 miles from the coast and roughly parallel to it. Eight miles north of the 9th degree of south latitude, the Owen Stanley range culminates in Mount Victoria, the highest mountain in British New Guinea (13,121 feet). A pass (the lowest part of which is 6500 feet above sea-level) occurs about 4 or 5 miles south of lat. 9° S.; it is known as "the Gap." The central range of mountains is very fertile, whereas the ranges of hills and mountains to a distance of about 15 miles from the coast in the neighbourhood of Port Moresby are, comparatively speaking, barren. The broad belt of densely wooded, broken country between the coast ranges and the main range is also very fertile. Atsiamakara—the Taburi village that we visited—is just at the inner boundary of the relatively barren coast ranges.

At various spots along the coast—as, for example, at Port Moresby, Gaile, Kapakapa, Bulaa, Keapara, etc.—there is a maritime population of fisher-folk, who are obviously an immigrant people. Sometimes these have effected a lodgment on the land, and may, as at Bulaa, possess a small tract for gardens; and there is often friction between the fishermen and the autochthonous agricultural coast population. In Port Moresby the two peoples live together amicably, the fishing Motu living in one part of a village, and the agricultural Koitapu in another. The former look down on the latter, but at the same time fear the power of their sorcerers, and propitiate them when they require a fair wind for sailing or good weather for fishing. Other examples are known of a dominant people being dependent upon the magicians of the people they have conquered. Various combinations have occurred in the recent history of British New Guinea for aggression and reprisal along the coast; but, speaking generally, these two groups are usually opposed to one another.

Probably owing to their rich soil and fine climate, the mountaineers of the main range have a splendid physique, and are fine hardy men. They hunt the wild pig and other animals, but they are great gardeners, and have large plantations of indigenous sugar-cane, as well as of yams, sweet potatoes, and bananas. There is a superabundance of native food, and tons of it may be seen left to waste. Excess of food means plenty of leisure, and the energy begotten by such a country and good food must have an outlet. Naturally the people take to raiding their neighbours, and consequently there is a continual pressure, as it were, from the mountains towards the coast. It might be supposed that the intermediate belt of fertile hilly country would produce men strong enough to withstand the main range mountaineers, but it does

not, and the reason appears to be that there is no inter-tribal combination. The villages are usually small, from half a dozen to eighteen houses, and generally situated on the top of a steep hill or ridge. Many of them have tree-houses as places of safety, and quite a number, especially those towards the interior, are stockaded. The stockades may surround a village, or occur only as a close fence at each end, the object of which is to prevent the village from being rushed. Usually there is on the top of the stockade a projecting platform slanting upwards, up which the besieged rush to throw spears at the enemy.

Round about "The Gap," in the main range, five powerful tribes, Baura, Agi, Manari, Hagari, and Efogi, a few years ago entered into a sort of confederation, but only for aggressive purposes. A native, in

THREE GAILE NATIVES: MOTU STOCK.

describing this, illustrated his meaning in the following way: he was chewing sugar-cane at the time, and he gathered up the dry fibres into a heap, and then scattered them apart to express the dispersal of the tribes after a foray.

This confederation has harassed an extent of country that cannot be less than some 50 miles in length and 30 miles in breadth; over a large tract of this area the country has been depopulated and numerous villages entirely destroyed. The intermediate country being thus subjugated, the confederation had commenced operations quite close to the coast, when it was broken up by the Government; but it does not appear that even now the Hagari have been properly reduced, though their influence has been diminished.

The hill tribes of the interior have also played a similar game on the coast tribes. There was little to choose between them and the main range tribes, except that the latter were the more powerful.

A brief account of some recent history will illustrate the seethings that take place in a savage country, and the difficulties which a civilized government has to contend against.

In 1884 an expedition was despatched by the *Age* of Melbourne to explore in British New Guinea under the leadership of Mr. G. E. Morrison. He had not proceeded far up the Goldie river (the main upper affluent of the Laroki) when he came into conflict with the natives. A large part of his outfit fell into their hands, and he returned to Port Moresby severely wounded by a spear. His assailants were the Varagadi or Ebe tribe. It was an unfortunate occurrence both for Mr. Morrison and for those that followed him, as his expedition undoubtedly created in the minds of the Ebe people exaggerated ideas of their own prowess, and a desire for plunder at the expense of the traveller or others not able to defend themselves.

Three years later Dr. H. O. Forbes led a Government expedition into this district, but he had the misfortune to come into contact with the Ebe tribes that had driven back Morrison, and, further, to impinge upon the more remote fighting tribe of Baura. It was impossible but that the expedition of Mr. Morrison should increase the risk to which Dr. Forbes's party was exposed; but this risk was very greatly increased for future travellers by the expedition of Dr. Forbes—not only was the hostility of the Ebe or Eburi confederation confirmed, but the more powerful and warlike Baura tribe were animated with analogous feelings. The then Government took no steps to quiet the district, and, as a result, for several years there were murders and raids of the stronger tribes upon their weaker neighbours. After one abortive attempt to arrest some of the ringleaders in 1893, a punitive expedition made a descent on the Varigadi tribes, but did little more than chase them across the Vanapa river and secure a few prisoners. The country still remained unsettled and unsafe.

Towards the end of 1896, Alaise S. Anthony—a coloured man who collects natural history specimens for Rothschild—organized an expedition from Port Moresby to the gold-workers on the Mambare river, on the other side of the main range. He reached the Baura country, and for four days tried to get carriers to transport his baggage further inland. The natives refused, and, to show their unwillingness, cleared off into the bush. In the middle of the night of November 3, a Loyalty islander, named Willy Lifu, who was one of the "shooting boys," said he felt hungry, and foolishly left the others and made up a fire to roast a couple of yams; whilst doing so he was speared through the leg. The camp was roused, and a good deal of indiscriminate firing took place into a stockade at one end of the village and into the bush, though

no further attack was made by the natives. The party bolted next morning, leaving behind them nearly all their baggage and trade, including a Winchester rifle with the magazine full of cartridges. On the way back another collector named Rochfort strayed from the main party, and was bushed; fortunately, he was shortly afterwards rescued by Mr. Ballantine.

About the same time the Wamai joined the Uberi in a raid on Awaiatenumu, a village of the Gasiri tribe situated about 15 miles from Port Moresby. The Hogeri (Sogeri) intermarry with the Uberi, but they did not take part in this particular massacre. This tribe has been visited by very many travellers, and was known to the members of the London Missionary Society twenty years ago. Mr. Ballantine, a Government officer, went out to punish the Uberi. The difficulty in all such expeditions is to get at the men; forced marches have to be made through unknown and usually very difficult country, and care has to be taken not to give the alarm. The most frequent plan of attack is to surround a village at night, and then rush it; but often warning has been given, and the village is found to be deserted. It not unfrequently happens that when a village or plantation is rushed, all the men escape, and a woman or two, with perhaps one or two children, are captured. These are invariably well treated, and are employed to open negotiations with the men by shouting out to them, and voices from the bush sing out in reply. It is surprising to what a distance these bush people can call to one another by employing a far-carrying sing-song intonation. There is also the language difficulty. On one quieting expedition Ballantine took with him a series of five interpreters, and the information had to be conveyed in this roundabout manner. If it is difficult to get the truth from one Papuan, how much more must it be through the intermediary of five!

The Uberi people were very difficult to get hold of, and for a long time they would not submit; Ballantine had to visit them five times before they became thoroughly amenable. During this time large parties of police and bearers had been knocking about the Uberi territory, living on their gardens and chevying the men from place to place. In order that the police should have no shelter, the Uberi burnt their own villages, amongst which was the village of Ube, with its eleven newly erected houses. Only two Uberi men had been killed and two captured, but the tribe had been well punished, there was not a house left standing belonging to it, and they were by this time short of food. When they finally submitted, they sent for a shirt for their chief to wear, in order that the other tribes might see that they were now at peace with the Government. The chief's shirt is now the recognized symbol of loyalty in this district.

In 1897, five men, five women, and two children of the Uberi were massacred by a combination of the Baura, Agi, Hagari, etc. The Uberi

chief, Inawe, stated that the Uberi had always been subject to be raided by some of the Baura confederation, although they used sometimes to join the rest of the confederation to attack others. After the Awaiatenumu massacre, the frequent visits of the police had compelled them to leave their own district and go further inland, where they made new gardens. It was here they were attacked by the confederation.

The Uberi tribe is now quite friendly to the Government, and has asked to be put under its protection against the Baura confederation. They had themselves experienced the strong arm of the law, and now they were glad to be under its protection, and to let their hereditary enemies undergo a similar experience.

In the latter part of 1896, some 150 to 200 Hagari warriors made several raids on the Varigadi (Waregare, or Boregade) natives. The Hagari live on the southern slopes of Mount Service. So far as I can make out, three were killed in September, nine in November, five in the middle of December, and seven later in the same month. Kadavi, the chief of the village of Bohula, appears to have been the instigator of these massacres; to use the expressive characterization of him by a native, "his inside was like fire." He sent three men on ahead to cut a road through the bush to Varigadi. On their return there was a big feast at Bohula, where the fighting men from six villages had collected preparatory to starting on the raid.

Commandant Butterworth, who led the punitive expedition against the Hagari, took Bohula, their principal village, and secured one man, one woman, and four children as prisoners; one Hagari man was shot. The captured man had been induced to approach to receive a present, and was then seized and made a prisoner. He was taken to Port Moresby where, unfortunately, he died; the others were released when the village was left.

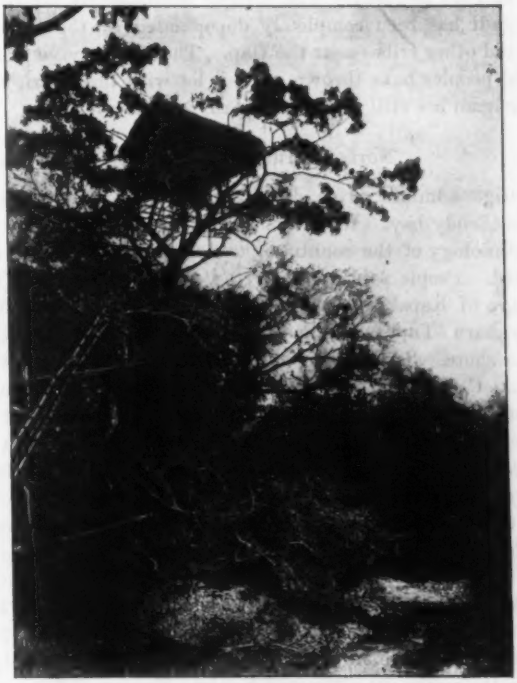
The Hagari fathers were greatly excited about the fate of the captured children, and were immensely relieved when assured by the woman of their safety. In spite of the invitation of the woman, the men would not come near the police camp, but shouted out in defiance, "The fish swim underneath, the birds fly above, but you have only one road. Dance, sing, eat our pigs; but how do you expect to return?"

The commandant replied that he would go back on the following day, and defied them to do their worst.

The Papuan warriors are certainly as great at boasting and bluff as were the Homeric heroes or the ancient Irish champions, but when it comes to blows they are often sadly deficient. Needless to add, Commandant Butterworth was not attacked, though a few spears were thrown at intervals at his men as he marched back to Port Moresby.

The unfortunate village of Awaiatenumu, which has five houses on the ground and six tree-houses, was attacked at daybreak on July 16,

1897, by the Baura-Agi confederation. The enemy arrived close to the village, and, being distributed into three bands, rushed from different directions down the hill through the plantations, leaving in their track three lanes of fallen banana and paw-paw trees. All the women and children had passed the night in the tree-houses, the men and lads sleeping below. On hearing the raiders rush through their gardens, all those on the ground scurried up the ladders to seek safety in the tree-houses, with the exception of two boys, who took shelter in a grassy



TREE HOUSE, GASIRI, CENTRAL DISTRICT.

patch, where one of them was caught and killed. All the men escaped injury except the last, who was speared in his right ear and in the thigh and leg as he was mounting a ladder. The enemy stayed in the village till mid-day, and then retired.

It seems obvious to us, if murder and plunder were the real objects of these forays, that nothing could be easier than to cut down the trees that support the tree-houses after the refugees had hurled away all the spears and stones which they store in these houses for such emergencies.

This is not, however, the fashion of native warfare, and, insecure as they appear to us, these tree-houses are real refuges. The mountaineers carried no clubs, but had spears and some tomahawks and half-axes which formed part of the trade forsaken by Anthony's expedition. The Baura men had rehafted the axe-heads on to long handles to make them more effectual as battle-axes.

This attack on Awaiatenumu was quite unprovoked, but the confederation, having swept all the intermediate country, was extending its operations, and even had the temerity to come within a short distance of Port Moresby. The district inhabited by the Ebe, Bereka, and Varigadi has been completely depopulated by the Wamai, Baura, Hagari, and other tribes near the Gap. The few survivors of the first-mentioned peoples have thrown in their lot with the Uberi, while some of the Varigadi are still on the Vanapa river.

Notes on the Rigo District.

The Rigo administrative district extends, I believe, from Gaile (Kaile) to Cloudy bay. We did not get beyond Keapara.

The ethnology of the country inland from Round head is somewhat complicated. People said to be of the Motu stock occupy the coast. The village of Kapakapa was formerly a purely marine village, but, like Lakwaharu (Tupuseleia) and Gaile, the inhabitants are also building on the shore. Sir William Macgregor encouraged this departure; but Mr. A. C. English, the very efficient Government agent for the district, states * that it is regrettable from a sanitary point of view, as the natives are far cleaner and healthier in their villages built over the salt water. He also informs us † that the natives of Lakwaharu have no record of occupation, but that they are the aboriginal owners of the land. If that be so, one fails to see why they built their village in the sea, unless, indeed, they had been driven there by a stronger people from the interior. It is only in recent years that the people of Gaile have worked in their gardens without constant fear of attack by neighbouring tribes. Three typical Gaile natives are figured on p. 279.

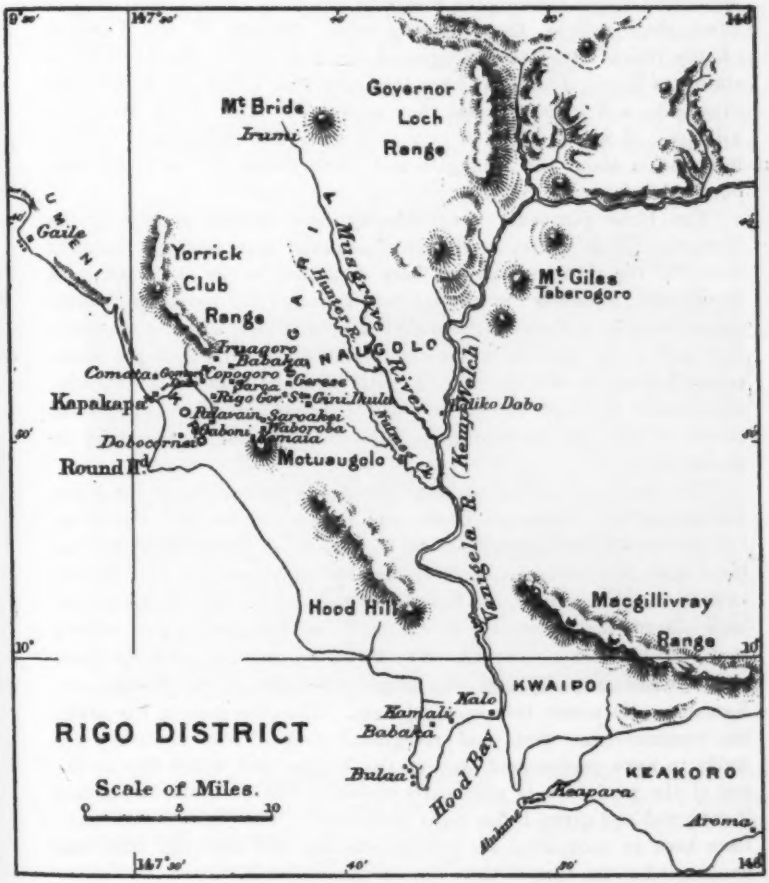
The Ikoro tribe live in a narrow zone which extends only a mile or two from the coast; the villages of Komata, Tagama-Keketo, Palavain, and Gaboni belong to this tribe. Behind these again are the Sinaugolo villages of Iruagoro (the chief village at Rigo), Babaka, Kopogoro, Saroa, and the new village of Gomori Dobo—this is near the Government station, which is perched on a small hill called Kupogolo or Kukogolo. Much further inland, on the Vanigela river, is the Sinaugolo village of Kaliko Dobo.

Inland from the chief Sinaugolo villages are Gerese, Gini Ikula (or

* 'Annual Report on British New Guinea,' *C.A.* 35, 1894, p. 53.
† *C.A.* 93, 1894, p. 64.

Gosoro), Wasira, Usia, Gea, Garia, and Kiratu, which belong to the Garia tribe, who speak a language distinct from that of the Sinaugolo, and they are stated by the latter to be crude and stupid.

We may regard the Ikoro as representing the indigenous population.



Their land has been invaded from the sea by the Motu, who have done little more than accomplish a lodgement on the coast; but there have been two distinct invasions from the interior. The Sinaugolo originally came from Keragoro, close to Taberogoro near Mount Giles, the people of which place speak a language closely allied to and understood by the Sinaugolo. The Sinaugolo villages are now interspersed among those

of the Ikoro, and the forward movement is still taking place, as the Sinaugolo have migrated 3 miles nearer the coast during the last ten years. A Sinaugolo boy with wavy hair is figured on p. 270.

The second and later invasion from the interior started from Governor Loch range, and was that of the Garia tribe. They went southward, and on striking the Musgrave and Hunter rivers they travelled down their valleys, then crossing other affluents of the Vanigela (Kemp Welch river), they stopped at the hills behind the Government station of Rigo. The Garia have thus migrated across the path of the Sinaugolo, and in many cases they occupy the sites of old Sinaugolo villages. I am indebted to my colleague, Mr. Seligmann, for this information about the Sinaugolo and Garia tribes, and he in his turn obtained it from Mr. English.

The Hood peninsula has evidently been formed mainly by the Vanigela. It is a low, level spit of sea-sand and alluvium brought down by the river, which has been deposited in the salt water, and then heaped to leeward by the indirect action of the prevailing south-east wind. This combination makes a light, fertile soil. A considerable part of the peninsula consists of grass land, with scattered screw pines (Pandanus) and small trees, with here and there a few cycads; occasionally there are patches of bush or jungle, and groves of cocoanut palms. There are also numerous gardens, which the natives keep in beautiful order.

The peninsula is divided into five lands, belonging to the Kalo, Kamali, Babaka, Makirupu, Oloko, and Diriga people. The last three villages were so decimated by sickness some three generations ago that there were few survivors, and the smaller numbers that still remain have recently been driven to Babaka by the Bulaa. The Bulaa people have planted many cocoanuts on the land, but the greater part belong to the three tribes mentioned. The Bulaa people now claim the land, and this has naturally been the cause of friction, as the Babaka and Kamali people resent this encroachment. The Government has taken the common-sense view, and recognized that it was necessary for Bulaa to have garden-land, and as the Diriga land, which lies at the end of the peninsula, is practically unowned, the Government has had it surveyed and given Bulaa legal possession. The Kamali state they have been in occupation for ten generations, and that the land was unoccupied at the time of their first settlement on it.

The village of Bulaa, or Hula, as it is generally called, consists of four groups of pile-dwellings in the sea, each group having its distinctive name. The Bulaa people have occupied this shore for about thirty-eight years only. Formerly they lived in the village of Alukune, or Harukune, which is adjacent to Keapara (Kerepunu). For generations the former have been subservient to the latter, who have been in the habit of levying toll from them in the shape of fish and other

marine produce. The Alukune possessed no land, and were not allowed to acquire any, though their masters of Keapara had more than enough for their own wants. Vegetable food being a necessity, they bought it from Keapara, giving fish in exchange, which Keapara, being the stronger tribe, were able to obtain at a very cheap rate. They were not only oppressed in this and other ways, but their women were seized and taken as wives by Keapara men. Half of the village, driven to desperation by the oppressions of these people, left in a body and settled at Hood point, and built the village of Bulaa. The other half who remained were still held in subjection by Keapara, and their condition was but little improved since the old days until very recently, and even now they do not appear to be in a happy or thriving condition.

VILLAGE OF KALO.

Although the inhabitants of Alukune are fisher-folk, they obtain their canoes from Keapara, and for these they pay heavily. I was told it was half the catch, in other words, they traded on the half-profits system. I believe a canoe debt is rarely cleared off.

Canoe-making is the great industry of Keapara, and it is an unusual sight in New Guinea to see men constantly actively at work, and to hear the rhythmic chops of the stone adzes hollowing out one or two canoes at a time. The sense of smell is also affected, not only by the smoke of the fires that are lit outside and inside the canoes, but also by the very disagreeable odour given out by the soft wood as it is chipped by the adzes.

The Keapara folk have always been somewhat turbulent, and have often stimulated Kalo to oppose the Government. Keapara trades marine produce with Kalo for garden produce, but I am not sure how far it is Keapara proper or Alukune. The Kalo people are so well off and think so much of themselves, that they make no advances to Keapara, and, instead of meeting them part way, and so forming a market-place as is done in the Mekeo district, they force the Keapara women to trudge round Hood bay in order to trade in the village square of Kalo.

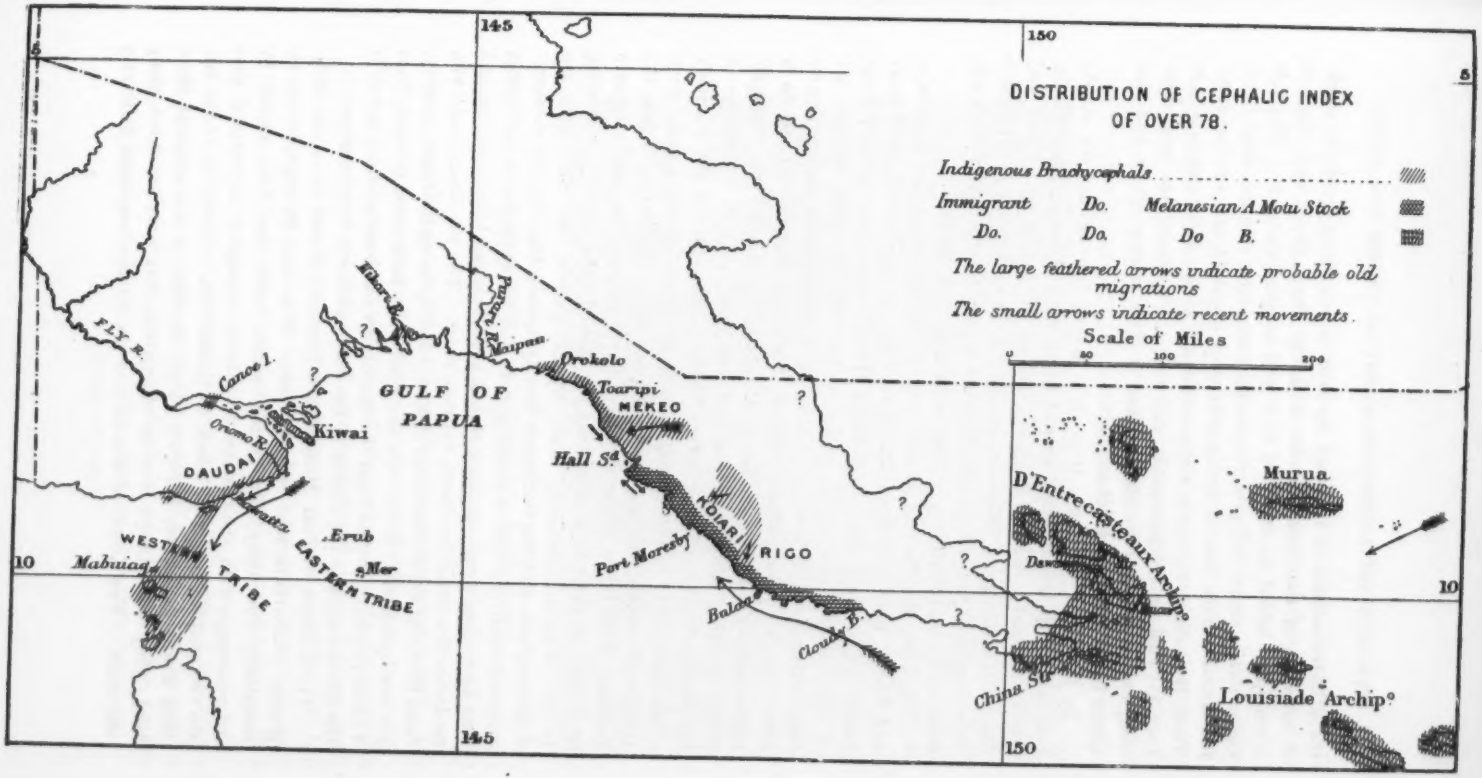
Kalo has an important situation at the mouth of the Vanigela river, as it can command the trade between the interior and the coast. Feathers and feather ornaments, grass armlets, boars' tusks, bamboos, trees for canoes, building materials, are retailed to the coast tribes, and fish, shell-fish, shell ornaments, and the like are traded in exchange. The soil about Kalo is very fertile, and produces abundant crops of coconuts, areca nuts, bananas, yams, sweet potatoes, and the like. As the inhabitants have the trade of the important Vanigela river, and can supply all their own wants by themselves, they have become a rich and powerful people; indeed, Sir William Macgregor regards Kalo as the wealthiest village in British New Guinea. The village is remarkable for the strength and size of its houses; some of the hard-wood piles on which they are built are of very considerable thickness and of great height. We measured some 18 inches in diameter, and 30 feet in height. Many of the planks used in flooring the houses and platforms or verandahs are of wonderful size, especially when one bears in mind the imperfect tools by which they are made. The wood employed is so hard that boards are handed down from father to son as heirlooms, and the house-piles last for generations unless burnt down.

The story of the massacre of mission teachers in 1881, at Kalo, at the instigation of the chief, is told by the Rev. James Chalmers, in 'Work and Adventure in New Guinea,' and in 'Pioneering in New Guinea' he gives an account of how the massacre was punished and the chief lost his life.

The Geographical Distribution of the Cephalic Index in British New Guinea.

I have tabulated all the information that has been published concerning the craniology of British New Guinea, together with the observations on skulls and on the living made during our recent expedition; but I propose giving only the conclusions at which I have arrived; the details will be published elsewhere. I would like to take this opportunity of thanking Mr. Seligmann for allowing me to in some measure anticipate the results of his personal investigations.

A consideration of the available data brings out the fact that a dolichocephalic population is present practically everywhere, so far as is known, in the British possession. In the China straits district and in


DISTRIBUTION OF CEPHALIC INDEX OF OVER 78.
Indigenous Brachycephals
Immigrant Do. Melanesian A. Motu Stock
Do. Do. Do B.
The large feathered arrows indicate probable old migrations
The small arrows indicate recent movements.
Scale of Miles
0 50 100 200
145
150
5
10
FLY R.
Canoe I.
Kiwai
GULF OF PAPUA
Orokolo
Toaripi
MEKEO
Hall Sd
DAUDAI
WESTERN TRIBE
EASTERN TRIBE
Mabuiag
Erub
Mer
Port Moresby
KOIARI
RIGO
Murua
D'Entrecasteaux Archip°
Louisiade Archip°
China Str

the d'Entrecasteaux it is mixed up with a low brachycephalic stock. A seriation of the measurements made by Sergi shows that there is a maximum about an index of 71·5, and another about 78. The few China straits crania tell pretty much the same tale. On the other hand, the Murua crania have a feeble maximum about 77, and another at 81. These facts seem to point to the conclusion that the dolichocephals have been invaded by brachycephals, and that the mixture has been more complete in Murua (Woodlark island). The brachycephals had also larger heads than the dolichocephals.

In the Hood peninsula there is a mixed population; the scanty evidence points to the inland natives being more or less dolichocephalic, while the coast village of Keapara gave an average index of 80·7, and the marine village of Bulaa an average of 82 in the living. It should be remembered that the people of Bulaa migrated about thirty years ago from Alukune, the fishing village associated with Keapara.

The Ikoro are the indigenous tribe of the district about Kapakapa and Round head. Unfortunately, we have no measurements of these people. The Motu have established themselves in the marine village of Kapakapa. To a certain extent, mixed with the Ikoro villages, are some villages of the Sinaugolo tribe; their villages now mainly cluster about the Rigo Government station, but their district extends in a north-easterly direction as far as Mount Giles, beyond the Vanigele river. Cutting across this area and occupying part of the valleys of the Musgrave river, Hunter river, Nutmeg creek, etc., is the territory of the Garia tribe. The Sinaugolo and the Garia certainly came from the interior mountain ranges; the former were the first to invade the territory of the Ikoro, whom they have driven before them, and it appears as if they, in their turn, were being pressed by the Garia. According to the skull-measurements made by Seligmann, the Sinaugolo are dolichocephals, and the Garia low brachycephals, but from his measurements of the living head it would appear that the examples of both tribes that he studied were a mixture of dolichocephals and brachycephals, and no distinction could be drawn between them. The two Irumi men, who came from the south-west slope of Mount Bride, far up the Garia country, are brachycephalic (81·9). On the whole, the facts seem to imply that a brachycephalic people from the mountains has been pushing before it the dolichocephalic population of the hills and lower river valleys.

The Koitapu of Port Moresby are generally stated to be the indigenous inhabitants, who own the land. They may be regarded as an essentially dolichocephalic people, whose index has been raised by intermarriage with their Motu neighbours, though I understand that the two peoples keep very much to themselves. According to the late Hon. Frank E. Lawes, Porepore (Port Moresby) is the original Motu land; they have always been in occupation, but have extended along the coast. The Koiari of the hills in the interior are more distinctly

dolichocephalic. The mountaineers appear to be low brachycephals. Those whom we measured were, like the Koitapu and Koiari, below the average in height, having a stature of 1·607 metre (5 feet 3¼ inches).

I do not find it easy to suggest an ethnological history of the Mekeo district. Apparently, a people of the same stock as the low brachycephalic mountaineers descended from the mountains and took possession of the fertile alluvial plains watered by the Angabunga and Biaru. It is true that very little trace of the supposed indigenous dolichocephalic population appears to persist according to the head-measurements taken

KOIARI MEN OF THE VILLAGE OF MAKABIRI.
A. Maraga (the chief), height 1692 (5 ft. 6½ in.), cephalic index 77·2.
B. Meya ,, 1657 (5 ft. 4½ in.) ,, ,, 70.
TYPICAL BEARDED PAPUANS OF THE CENTRAL DISTRICT, WITH SPIRALLY COILED HAIR.

by me, but I suspect that this element does occur to some extent. The Motu stock has advanced as far up the coast as Delena.

Fathers Jullien and De Rijke state that the natives on the mountains immediately behind Hall sound, the Boboleva (Mount Davidson) range, are quite distinct from the coast tribes. Seligmann finds the Uni Uni folk of the village of Emene are low brachycephals (min. 73·5, max. 81·7, av. 78·6), but the eight men he measured do not appear to be a homogeneous group.

Still further inland, these Sacred Heart missionaries found on the upper waters of the Alabule (upper waters of the Angabunga) another type of native, evidently an example of the convex-nosed Papuan ("Semitic type"), which is so widely distributed over New Guinea.

(*To be continued.*)

KING MENELEK'S DOMINIONS AND THE COUNTRY BETWEEN LAKE GALLOP (RUDOLF) AND THE NILE VALLEY.*

By the late Captain M. S. WELLBY, 18th Hussars.

BEFORE speaking of my travels beyond Abyssinia, it may be of interest to give some account of my experiences in Abyssinia itself. I do not think it is generally understood how far towards the south the Abyssinian dominions really extend, for they nearly touch the two big lakes of Rudolf and Stefanie, or, more correctly speaking, Gallop, or Buzz, and Chuwaha. It always strikes me as a mistake to call a lake or mountain by any other name than that by which it is recognized amongst the tribes living in the neighbourhood.

Although I am about to speak of Abyssinia and of its people, and even at times venture to offer an opinion, at the same time I in no way presume to pose as an authority on the country. Had my sojourn of months been one of years, then my claims might rest on more substantial grounds.

On the afternoon of September 13, 1898, I started from Berbera, one of our ports on the Somali coast, accompanied by Duffadar Shahzad Mir, 11th Bengal Lancers, who had previously travelled with me across Tibet and China, in company with Lieut. N. Malcolm of the 93rd Highlanders. Shahzad Mir is a trained surveyor, and on the present journey surveyed our route by plane-table at 4 miles to an inch, whilst I took observations of latitudes, heights, and temperatures. My only other companion was in the shape of a fox-terrier, "Lady," who completed the entire journey, and is now awaiting my return at Alexandria, together with her son "Puppy," born on our travels.

Eight hired camels sufficed to carry our goods and water, but when the Somalis saw the insignificant size of my caravan, they exclaimed, "That gentleman won't go very far!" There were consequently many applications for service under my flag, though I enlisted only two servants, one called Mahomed Hassan, to look after my property, who very faithfully served me throughout my travels; and the other to cook for me, who rejoiced in the very appropriate name of "Hash."

In the absence, at Berbera, of mules or ponies, we set out on foot, steering a direction west by south, and in ten days reached the Abyssinian frontier fort of Jig Jigga. Here a few days' delay was forced upon us till permission had arrived from Harrar for our onward progress. Ras Makonnen, King Menelek's nephew, who governs Harrar and its dependencies, readily gave his consent, and somewhat upbraided the official at Jig Jigga, who, by the way, was a most obliging Arab, and had merely carried out his duty, for having delayed me. The moment

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* Read at the Royal Geographical Society, June 18, 1900. Map, p. 380.

we left Jig Jigga a thorough change in the aspect of the country was observed, for instead of the thorn bush and sandy plains so typical of Somaliland, we passed through a smiling country of hill and dale, rich in cultivation and rivulets, and we could quite understand how, when Menelek claimed the fort of Jig Jigga as the western extremity of his dominions, his decision might have been actuated by the lie of the land itself, and quite properly too.

At Jig Jigga we had risen some 5000 feet from the sea-level, and we had another 2000 feet to mount before reaching the town of Harrar. I was fortunate in finding encamped without the walls of the town H.B.M. Agent, Captain Harrington, through whose kindness and able assistance I had no difficulty in preparing for my journey to Addis Abeba, the capital of Abyssinia. Before starting I enjoyed a few days' rest on the bracing hills of Harrar, overlooking the greenest and most fertile of rich valleys.

On October 6 everything was in readiness, and Harrington and I started for the capital. Two days later we were joined by Mons. Legarde, the representative of France, and by Ras Makonnen, with a following several thousands strong. Though it was interesting enough to watch the methods of marching and camping of Ras Makonnen's host, still there were drawbacks connected with it as well, for along the road our life was frequently more or less in jeopardy. Every one strove for himself to reach the next camping-ground, and these multifarious exertions along a single road were bewildering and far from pleasant. Some Abyssinians were mounted on mules or ponies, others were walking, yet all were armed with guns, sticks, swords, or tent-poles. Then there were no end of animals laden with flour and driven along by the soldiers' wives or servants, who generally carried their master's shield or gun; there were women with burdens of flour and broods of youngsters, white-turbaned priests, living beef and mutton, petty chiefs, with mounted attendants—a striving endless stream, all bound for the same point, and all moving at a different rate. No wonder, as we tried to ride along quietly, we would sometimes find ourselves half knocked out of the saddle by a laden mule tearing past at break-neck pace, then, just as we were recovering, a prod from a pole in the other side would surprise us, almost breaking a rib, and at the same moment a bullock just in front would suddenly halt. After a few days of this fun, we were glad to quit the society of the Ras's army, and enjoy the grand forests of cotton trees and park-like land through which the road to the capital runs. The two salient features that struck me as remarkable during this portion of the journey were, firstly, the vast stretches of grass land that lay idle; and, secondly, the scarcity of villages and cattle, for it would be difficult to hit upon land more suitable for growing and breeding.

On October 25 we reached Addis Abeba. The most striking fact with

regard to the capital was the absence of trees. Though formerly thickly wooded, these have by degrees been cut down for domestic purposes, and each day wood becomes dearer in proportion to the distance from which it has to be brought in. Whether the capital will be shifted, or trees will be planted, or wood will be considered unnecessary, remains to be seen.

I should have mentioned that at this time Ras Mangashia, the governor of Tigré, had displeased King Menelek, who was about to march northwards against him, to try and bring him to a sense of loyalty—hence the arrival of Ras Makonnen and his support. In two or three days' time I found myself marching towards Tigré with the king and a following of something between 50,000 and 100,000 strong. Undoubtedly the most picturesque group in this mighty host was Queen Taitu herself, who was seated on a mule and surrounded by her lady attendants, likewise mounted, each of whom carried a bright and different-coloured sunshade. They were preceded by a group of mounted reed-players, and escorted in front and in rear by a guard of cavalry soldiers. As this pretty party drew near me, I felt anxious to show my respect for them, yet hardly cared to imitate the custom of the villagers along the route, who stripped themselves to the waist and cried aloud "Janhoi! Janhoi!" (King). I contented myself with lifting my hat and sticking to the rest of my garments.

I have no time to tell you how the king showed himself to be a sportsman by the way he rode in mimic battles and by the way he cast his javelin, or how he showed his generosity by the lavish way he feasted his subjects, or how he showed his consideration for the poorest of his beloved people, or how he showed himself to be a mighty organizer and administrator, and how he showed himself to be a genial and thoughtful host; I will merely mention his own kindness towards myself, for one day he informed Harrington that I might travel wherever I chose in or out of his kingdom, and, furthermore, that he would assist me in every way he could—a promise he most faithfully observed. On bidding farewell to the king, I sincerely thanked him for his goodness, and asked him what could I do in return, for I had not even made a present to the monarch. "Nothing at all," he said; "only let me have copies of the maps you make of the country you go through."

We had been travelling with the king through a continuation of broad green-turfed and well-watered valleys, separated by low ridges; thus, with a keen frost by night and a clear sky by day, nothing could be more enjoyable. We returned to the capital by a more direct route, traversing narrower valleys, some of which were rich in cultivation and bounded by basalt-crested hills. There grew the juniper and kusso trees, the latter with its large red hanging flower, so famous as a medicine. We then crossed a pass called the Hulu Koh, said to be over 12,000 feet high, thence to the Entoto range of hills, nearly 10,000 feet high, which

overlook the present capital, planted 2000 feet lower in the plain below. Arrived at Addis Abeba, I set about collecting a caravan for the journey that lay in front of me. There was no lack of volunteers, and I was soon ready to start.

My party consisted of 30 Abyssinians, 9 Somalis, and 5 Sudanese, Shahzad Mir, and my terrier. My Sudanese had previously taken part in the Bòttego expedition, and were with the Italian when he was killed by the Abyssinians. I carried nearly four months' supply of food for every member, in the shape of "durgo" flour, and "durgosh," a preparation from the same—a decidedly useful article, for it is merely mixed with cold water and is ready for eating. I also carried plenty of pepper for the Abyssinians; plenty of water-cans, and a collapsible canvas boat, so as to be ready for both a surplus and a dearth of water; 6000 rounds of ammunition, which was never required; tents for everybody; a theodolite, plane-table, barometers, thermometers, and hypsometer, and the general impedimenta required on such a trip, as well as cloth, beads, knives, and so forth, for barter. I may state that, contrary to advice, I used no filter and no bed, and was never unwell throughout the entire journey, excepting the day after my slight attack under the influence of the devils of Walamo; my only misfortune was losing a finger on the shores of Lake Rudolf.

From Addis Abeba we steered south for the sacred hill of Sakwala, which rises abruptly and conspicuously from the plains. At the summit I found a sombre lake, said to be of unfathomable depth, and nearly 9000 feet above the sea-level, water boiling at 195·8°, whilst the hills around that held in the divine water rose to a further height of 600 feet. Parts of them are thickly wooded, and harbour sacred buildings and holy men. There is a mysterious air of sanctity about the place, and many legends connected with the silent spot are credited. The moment we left the capital we fell in with the Gallas, and continued to meet different tribes of them in each district we traversed. All these Gallas have quite recently come under the sway of King Menelek. The result of this has been that with their independence they have also lost all inter-tribal strife, for peace reigns throughout the land. Of course the tribes vary considerably in their condition, according as they accept their ruler with good or ill grace. In some districts the discreet administration of King Menelek was obvious, for Galla chiefs were living in concord with Abyssinian officials, and ruling in combination. There is no doubt that Menelek aims at, and for the most part succeeds in, governing with justice the people and country he has conquered, and the ill doings that are sometimes recorded must be laid to the door of some of the petty officials, anxious to display their own authority, and not that of the king.

I will rapidly run through this Galla country, and which is subject to Menelek almost as far south as Lake Gallop itself.

Owing to the late arrival of my rifles, it was the middle of January, 1899, before we bade farewell to the saintly Sakwala and its neighbour, the river Hawash, so full of fish and hippopotami, which we had crossed on our way from Harrar to the capital. We steered again south for Lake Zuai, passing through the Arusi Gallas, and crossing the river Maki, which flows into the lake at its northern end. This fresh-water lake abounds in hippos, and extends southwards for about 30 miles, lying at a height of over 5000 feet above the sea-level. It is the first of an almost continuous chain of lakes extending as far south as Stefanie, or Chuwaha, and I followed a route more or less along the watershed running between this chain and the river Womo, or Omo. Along the western shore of the lake Zuai we found the Waiyu Arusi Gallas, and after them the Gombo Arusi Gallas; both of them were exceedingly poor tribes. Cultivation is unknown, but they possess donkeys of a good stamp, and depend for an existence to a certain extent upon the chase. They hunt the elephant with the spear, a more hazardous method, I should say, than that of the Hamran Arabs, whose prowess with the sword has been so graphically described by Sir S. Baker. At the southern end of the lake there is an outlet by the river Suksuk, which flows through banks of chalk 100 feet high, into a second lake called Hora, whose water, though brackish, is drinkable. Its banks are covered with a white crust of carbonate of soda, and show the marks of the numerous and varied game that comes to drink there. Along the shore, I met a hunting-party returning from the chase. They were walking by the side of their jaded ponies, and were thoroughly downhearted, for they had been away a week and had met with no success. I felt very sorry for the poor fellows, for these good people, despite their famished state, had brought me a goat and some honey. I afterwards fell in with another larger hunting-party. They were riding down a big herd of hartebeeste, and as they swept past my little party, I jumped on to my swiftest pony, and, seizing a spear, joined them in the fun. There is also a stream joining Lake Hora to a third lake called Lamina, whose water is exceedingly brackish, though the savages inhabiting the islands drink it, and the hippopotamus, as usual, thrives there.

A little west of Lamina we fell in with the Tuki Arusi Gallas, a, comparatively speaking, well-to-do people. Though they cultivate no crops, they collect the white crust from the edges of Lake Lamina, and sell it for grain to the Guragues, living further west. They are also keen elephant-hunters. After passing through the two small tribes of Adari and Waragi, we came to the Guragues of Wubarakh, having traversed park-like country fed by clear rivulets. These Gallas were a well-fed and cheery lot of fellows, evidently justly governed by the Abyssinian official, Ratti by name. We then continued south, and after crossing the river Shashago, reached the district of Kambata, famous for its hot spring. The vapour was rising from the ground in dense clouds,

and close by a party of Gallas had rigged up a temporary home to heal their complaints by means of the water, so esteemed for its medicinal properties. There is a pond some 20 yards in diameter, where the water was bubbling and hissing up at a temperature of 158° Fahr. There was also a smaller pool, whose water was bearable, and here the invalids lay and stewed. The rocks around were stained a reddish-brown colour. My fox-terrier unwittingly put her hind legs into the wrong pool; her sudden squeals at once told me of the mistake she had made.

The drainage, instead of passing into Lamina, as one would expect, is carried off southwards to Lake Abai. From Kambata we climbed the hills and traversed the fertile and mineral-famed district of Walamo, where, in addition to the usual crops, the red and black soils produce more particularly bananas, palms, tobacco, limes, cotton, ginger (called Zingerbil), raspberries, and godaris, a remarkably good vegetable. The whole country is hilly, and cut up by rivulets of the brightest water, along the banks of which grow big shady trees and a multitude of flowers and undergrowth, alive with birds of bright plumage. It seems strange and almost sad, that such a fairyland should be "devil-haunted." I have already spoken of the "devils of Walamo," and will merely draw your attention to a book which has most kindly been sent me by C. Hives, Esq., called Demon possession, where the experiences narrated of China are identical with those of mine in Walamo. There is a curious currency in vogue in this district—it consists of "dormas," which are thin pieces of iron about 2 feet long, fifteen of which go to an Austrian or Abyssinian dollar. One meets the Gallas of Walamo trudging to market with a load of "dormas" on the shoulder.

Throughout the whole of this Galla country, we constantly passed through markets, or gobiyehs, many of which are held in each district on certain days.

Our next province was Baroda, perhaps of greater beauty than Walamo, for the hills are loftier and afford superb views of Lake Abai to the east. Yet this is even again surpassed by the most southern district of Abyssinia, called "Gamo," where at a height of 10,000 or 11,000 feet high lie the most beautiful grassy slopes varied by rich foliage, from which glorious peeps of the lakes many hundreds of feet below to the west are had, and grand views of the ranges of hills eastwards. Throughout all this country, dominated by skilfully planted Abyssinian posts, I received the most lavish hospitality and genuine help and friendship from every Abyssinian general or Galla official I came across, and to them owe a debt of gratitude. On leaving Gamo for the plains, we had finished with the dollar and with Abyssinian kindness. We traversed the plains north of Lake Chuwaha (Stefanie), and crossing the hills of Hammer Koki, abounding in clear white marble and gold too, I believe, on the western side, fell in with the Wangobeino tribe, who are a branch of the Asilli. The Asilli are split up into nine subtribes or

divisions: (1) Bulema, (2) Buri, (3) Sambilli, (4) Bursa, (5) Chakanda, (6) Wangobeino, (7) Kasha, (8) Kulambeino, (9) Kurkuna. Of these, the Kasha and Wangobeino are considered to be most warlike. They believe in the heavens, which they call Wak, and agree that whenever it thunders a white man is born. They therefore believe that a white man can produce rain, as well as their own priest, whom they call Dobie. The priest also says a few kind words at marriages, and receives ghi, money and sheep, in return. The Asilli men may have four or five wives, paying as much as twenty sheep or fourteen cows for each. They bury their dead by wrapping a cloth round the body, placing it in a hole, removing the cloth, and covering the body. The cloth they get from the Borana tribes by Lake Stefanie, or Chuwaha. They adorn themselves with small copper earrings, and wear round the neck, wrists, and upper arms many iron, brass, and copper rings. Those round the neck are valued at the price of a cow. They also carry a knife locally made, secured in a leather sheath and fastened to a leather strap round the neck. The Asilli begged me to stop with them and show them how to make guns, that they might resist the Abyssinian raids, for they bitterly complained how all their property had been lifted. I asked how they managed to buy a wife when all their cattle had been taken. "Oh," they said, "we can't buy them now; they come to us instead!"

We met no other tribes till we reached the Gallopa of Lake Gallop (Rudolf), and before marching south I visited the river Womo, or Omo, and crossed to the village of Murle. The water here was not more than 30 yards broad, about 20 feet deep, with scarcely any appreciable current. At Gallop, or Rudolf, we lost more than half our transport from anthrax. In this predicament we turned our thirty head of cattle, which had been presented to me by the Abyssinian chiefs, into baggage animals. It will be gathered from this that our progress for about three weeks was wretchedly slow; I will therefore reverse the case and bring you with one bound to Teleki's volcano, at the southern end of the lake, with two short remarks. Firstly, there was no water flowing in on the eastern shore, nor could I find any 30 miles east of the lake. I should say, the only permanent supply of water running into the lake comes from the Omo at the northern end; but the lake bore no appearance of diminishing in size. The water, though quite drinkable, as our experience amply proved, is, however, scarcely pure. Secondly, on traversing the southern portion, which was a succession of igneous rocks reaching down to the water's edge, I came across a mass of camel-bones in one spot only, and curiously enough two of my cattle selected this very same spot to lie down and die.

At the southern end of the lake, we found the Lokub and Bomi tribes, the latter owning camels and the former donkeys, identical in form and carriage with the many wild herds of the district. The Lokub are a race of finely made men, with long hair stretching down

to the waist. They manufacture many wooden articles, such as water-vessels, bowls, and spoons, and make peculiar pack-saddles for their donkeys. They wear beads round their wrists, and rings of iron round the arm. Close to their village I found a quantity of rock-salt.

On leaving the lake to strike a westerly course, we ascended the hills over 1600 feet above our camp by the lake, and, after meeting the Turkana tribe, met the Loka; and I will show you how the Loka helped me to succeed in curing the natural bent of my Abyssinians, who were always eager to shoot every savage, or steal everything they saw, though never allowed to do so.

As regards raiding—which I may deal with later on—it must be remembered that the Abyssinians, like the tribes bordering on them, have for ages lived in internal strife and conflict with outside tribes. As it happens now, the Abyssinians have been permitted to receive unlimited supplies of rifles, and can indulge in their natural bent as much as they choose, unchecked by those less fortunately armed. Had their neighbours received rifles instead, they in their turn would have taken good care to pull off old scores and run free. When our relations with the Abyssinians are more friendly, and our dealings more direct, they will doubtless learn and approve of more civilized ways. As it is, the Abyssinians are not to be blamed for a moment; they would be foolish if they did not adhere to their ancient customs, when they can do so without harm to themselves, by the importation of so many firearms into the land.

When approaching any tribe, I would leave my caravan a mile or more behind, and go up to the people with a couple of men. On this occasion, I suddenly found myself close to the Loka, reclining under some dome palms. They sprang to their feet, and we stood facing each other, when they all at once turned and ran, leaving behind them an elderly lady. After loading her with presents, and explaining to her that I wanted camels, I sent her away. The following morning, when two of my Abyssinians were on watch over the mules grazing, they saw a single savage, leading a camel, coming towards them. As he came he picked up sand and let it trickle to the ground, as a sign of friendship. Then the inborn nature of the two Abyssinians displayed itself, for they sat down and began firing at the savage; still he came towards them, picking up sand, and still they fired. Closer and closer he came, within a yard, yet he and the camel were untouched; then one of the Abyssinians caught him by the shoulder, and the savage plunged his spear into his chest, doubtless fearing treachery. His comrade then struggled with the man, trying to gain the weapon. The Abyssinian won the victory, and plunged the spear through and through the body of the poor savage. At this same camp it chanced that another of my Abyssinians caught hold of some of the property left under the palms by the Loka, in the shape of some poisoned arrows; this black poison touched a

scratch on his finger. In two days the poor fellow died from it. After leaving this eventful camp my Abyssinians were as good as gold; their natural bent for shooting and stealing was completely crushed.

After leaving the southern end of Lake Gallop, I, roughly speaking, steered a westerly course till about midway between the lake and the Nile valley, and then travelled northwards through a blank on the map towards Fashoda. I will first mention the tribes we met, and then speak of the country we traversed.

Before striking north we several times came in contact with the Turkana, who border on the Loka, Sokul, Bomi and Karamojo tribes. On every occasion I found the Turkana quite friendly, anxious to trade with me, and ready to help me in the way of showing me where to find water, and giving me information of the neighbouring country. The Turkana are a fine race of men, and the families, which apparently exist in separate villages, vary in their development and stature. Some of the men stand quite 7 feet high, and are exceedingly muscular; their hair, resembling thick black felt, hangs over the shoulders right down to the waist. In the end of the hair they attach a thin curly stick resembling a tail, and are always careful, when sitting down and so forth, that it does not meet with any mishap. They wear rings of iron round the neck, forearms, and some of the fingers, ostrich feathers in the hair, brass rings in the chin and nose, rings of hair round the biceps, and sandals of elephant-hide. The women, who wore their hair in ringlets, were finely made and full of merriment, and, for savages, good looking. They brought me plenty of milk in wooden vessels. The men carry, as a rule, two spears, a stick, a long receptacle for tobacco, and a wooden sleeping-pillow. The Turkana live on meat and milk, and some of them possessed a little dhura, though not of their own growth.

The Loka were one of the nicest tribes I met; they were quiet, respectful, and intelligent, and are apparently raided by the Turkana. They too grow nothing, but possess donkeys and sheep.

Between the fourth and fifth degrees of latitude we came across a powerful tribe called the Abba. These people were most anxious to sell me dhura for beads, dhura which they grew themselves. The men, women, and children flocked to see me, probably the first white man they had seen. As usual, the men were quite naked, the women only wearing a small piece of skin. The men fashioned their hair into the shape of a saucer bottom uppermost. They carry two spears, a long and short one; the latter was sometimes entirely made of iron and carried in a leathern scabbard. They also have oblong shields of hide and thick straw, and smear themselves with mud and red stripes. They wear pieces of brass in the ears, and a kind of leathern sword scabbard on the wrist. They wear a mass of beads on the forehead,

whilst the women wear them round the neck. They are a fine race, and live in tukls raised some 5 feet above the ground.

I don't think they can be the same as the Arbore Gallas shown on the map, for the Abba are Gallas neither in appearance, habits, nor language. Other tribes north-east of the Abba we met were the Tamata, the Geyu, and Boma. All of these were friendly enough, possessing donkeys and sheep, and cultivating dhura. All these tribes in many respects resemble the Abba. About the sixth degree of latitude we met another powerful tribe, the second Boma, inhabiting hills between 3000 and 4000 feet high. At first they prepared to fight me, but on finding that I had only two or three men, and was not an Abyssinian raid, they soon became friends. The tribe carry three spears with a slender shaft, and smoke pipes, and follow the customs of the Abba. They inhabit a beautiful country of dale and stream, growing dhura and tobacco.

The soil is exceptionally rich and black; cotton, wild fruits, and fine timber adorn the hillsides. Next to the Boma live the Morelli east and north, and next to these the Nyuro, and working northwards the Shilluks (?), who would never come within several hundred yards of me; they fled from their well-provisioned villages and extensive fields of dhura, taking us for Abyssinians. The tribes of these districts would adopt the ancient English custom of making huge bonfires, the smoke of which would warn the tribes for miles around of our coming, and the signal would be passed on from one tribe to another. Though the people fled, nothing of their belongings was touched by us, excepting in three villages, from which we took some grain, leaving beads and other articles in place of what we had taken, and, as prices went, a full value. As we drew near to our Anglo-Egyptian fort of Nasser on the Sobat, we met the Nuers and Nyuaks, all of whom were extremely friendly, and already beginning to show beneficial results from the recent administration of the country. As we worked our way towards Fashoda we met the Dinkas and Shilluks.

It is impossible to speak more here about the tribes, as I still have to describe the country we travelled through between Lake Rudolf and the Nile valley. Generally speaking, the country consists of a number of ranges of hills running north and south, separated by green and fertile valleys.

Many of the high peaks appeared to be topped with white and pink sandstone dropping perpendicularly, whilst most of the hillsides were green with bush, trees, and grass, with rocks of basalt here and there. Before striking north we crossed the sandy bed of the river Turkwell, thickly and beautifully wooded on either bank, and traversed some of the ranges of hills, but not without trouble, for it was not always easy to find a way. Most of the valleys were wonderfully fertile, with rich alluvial and black cotton soil. I often wondered why there was nobody

to inhabit these inviting districts. On May 13, in about lat. 4°, we struck a source of the river Sobat. On reference to the map, it will be seen that the source we discovered, and which is called Ruzi by the natives, drains a great portion of the land and carries it off northwards for over 300 miles before eventually emptying itself into the White Nile by means of its mighty tributary, the Sobat. This stream, Ruzi, we more or less followed, till it eventually flowed into the large river. By more or less, I mean that on one day we could see the course of the river, and on others, owing to the flatness of the country or the intervention of a hill, we would lose sight of it, and once, when it took a big bend eastwards, we were without it for some days. After striking this source we continued through the same kind of country, rich in undergrowth, and at times fine timber, but at others displaying a gravel soil cut up by innumerable watercourses running into the Ruzi. There were elephants, giraffes, rhinoceros, antelope, guinea-fowl, partridges, and sand-grouse.

Almost 100 miles north of the source of this river, we struck another stream at a few miles west of its own source. This river was also named Ruzi by the natives, and it would thus appear that the word Ruzi merely signifies a river in the same way as we speak of the sea without calling it by any special name, or merely speak of "the river."

The source of this second Ruzi rose from a range of hills lying to our east, on the other side of which range flowed northwards our first Ruzi, after having made its bend towards the east. It was on the banks of this second Ruzi that we met the first Boma tribe. It flowed west at first, merely a streamlet, and then north over a magnificent prairie land alive with herds of gazelle, giraffe, and wild donkeys striped like a zebra. As we continued to generally follow the course of this river, the first Ruzi flowed westwards again, so that we marched north between the two streams, which sometimes were within 2 miles of one another. We passed through strings of villages, large tracts of cultivation, grass land, and forests, till eventually, in lat. 7° 50′, by which time we were on the right bank of the eastern or first Ruzi, we found ourselves on the banks of another river flowing apparently from the south-east. This river was over 30 yards broad, from 8 to 10 feet deep, flowing about 3 miles an hour, and infested with alligators. In spite of the steep muddy banks, we managed to successfully cross it, losing neither camels, donkeys, nor mules.

This third river, combined with the two Ruzis to form one, flowed northwards over immense plains and past villages that had been deserted many months. Keeping on the right bank of this river, we crossed another important tributary flowing from the east and then came to one that stopped our progress. It is known as the Baro, or Keir, and flows from the Abyssinian hills. It had evidently felt the commencement of the Abyssinian rains, for it was perhaps 50 yards broad and

flowing very fast, and, to judge from the thick colour of the water, was carrying off that valuable soil which enriches the Egyptian lands. This river combines with the river we were on and the united stream forms the Sobat. We therefore crossed our own river to the left bank, and then followed the Sobat north-west.

As we reached the neighbourhood of the Anglo-Egyptian fort of Nasser on this river Sobat, we were welcomed by the Nuers, who of their own free will crossed from the right bank of the river to conduct us to Nasser—a valuable help, as we had experienced considerable difficulty through our inability to avoid the swampy districts, in our ignorance of the lie of the land; though now, with the experience I have gained, I could march dry-shod from Nasser to the south of Lake Rudolf, excepting the actual crossing of rivers, and see no obstacles to prevent our laying a line of telegraph or even railway.

These Nuers, though some 600 miles from the centre of our administration, had nevertheless felt the beneficial results of it, as shown by their readiness to help a white man, and their craving for cloth, one of the first signs of civilization. I could not help comparing the probable future of the tribes who had now merely felt our rule, with those who were touched by the Abyssinians, and I wondered what would be the fate of the contented and harmless and naked tribes I had met who are so far independent and free, and untouched by either power.

We followed the left bank of the Sobat to its junction at Sobat with the White Nile, everywhere receiving kindness from the Nuers, Nyuaks, Dinkas, and Shilluks alike. From Sobat we proceeded to Fashoda, where H.H.S. *Fatch* conveyed us to Omdurman. Two or three weeks in this historical place allowed me to form some idea of the stupendous efforts, tact, and determination that must be needed to claim for cultivation the immense stretches of sandy barren land, and to induce hordes of irrational and indolent and trodden-down people to return and work for their own profit. Yet the strides that have already been made are worthy of admiration. At the same time I could not help reflecting that, had I the administration of this new country, I should feel inclined to dally but little over the sandy lands, but seek those fertile regions further south. At Omdurman I parted with my transport animals, including ten of the original mules that had set out from Addis Abeba seven months ago. They were sold by auction in the market-place. Here, too, my Sudanese, who had served me splendidly throughout, elected to remain. My Abyssinians and Somalis travelled with me to Cairo. Trains and boats they became accustomed to; they had been much interested in polo at Omdurman and in the workshops at Wady Halfa; and at Cairo the electric trams, carts, and bicycles (which they called "baklo" mules) evoked but little wonderment compared to the electric light and a water-tap. I think they will always remember their three days at Cairo, for the Sirdar himself came to see them, and

presented them all with plenty of food and new suits of clothing and rugs.

From Cairo we trained to Suez, whence a B.I. liner would convey them to Aden. From there the faithful Shahzad Mir would return to India, the Somalis to Berbera, and the Abyssinians to Zeila and Harrar. It was hard to part with these good fellows, and gratifying to hear them say, "My belly is full; I will go with you again." For it must be remembered that these Abyssinians were the first to leave their country in this way; they had never heard of any other country but their own, not even of the Sudan. They were not chosen men in any respect. They were merely loafers picked up in the market, ignorant of everything, excepting things within their immediate neighbourhood. Many of them were merely boys. It was, therefore, asking a great deal of men like this to travel to the margin of their own land, and through districts where the tribes are raided by strong forces of their own countrymen, thence to traverse for hundreds of miles an unknown and untrodden land; to work in swamps waist or neck deep, and live on what we shot, or on their own baggage camels, and to learn what thirst and hunger really are. Yet all this they did, and as soon as they had learnt their duty, served me well and honestly throughout. It will prove that in the Abyssinians—and we already know it of the Somalis—there is plenty of the right stuff that only requires developing.

Though I could have taken only Somalis, I brought these Abyssinians that they might see something of the civilized world and of our power, persuade others to follow their example, and take back with them happy reminiscences of their experiences whereby to help to maintain the present friendship existing between ourselves and the Ethiopian king.

Before the reading of the paper, the PRESIDENT said: We have been looking forward to the reading of this paper for several months, in the hope that Captain Wellby would be able to come here and read it in person; but, after going through the whole siege of Ladysmith, and being in a regiment which had to eat its own horses, he is now still with the army in the field under Sir Redvers Buller, so we must forego the pleasure of welcoming him home until next session.* Meanwhile we cannot put the paper off any longer, and Captain Wellby's father has kindly consented to read it for him.

After the reading of the paper, the following discussion took place:—

The PRESIDENT: Captain Wellby has gone over, during the greater part of this journey, entirely new and undiscovered ground, consequently there are not likely to be many persons here able to join in the discussion from personal knowledge, but we have gentlemen present who have been in other parts of Abyssinia. I am rather inclined to think that Colonel Prideaux is present, who was so many months a prisoner under King Theodor at Magdala; and Sir Thomas Holdich, who has travelled through a great part of the country and paid close attention to the subject. Colonel Watson is very well acquainted with the upper Nile and

* The sad news of Captain Wellby's death has since been received (see p. 358).

parts of the Sobat. I don't know whether any of these gentlemen will care to address the meeting.

Colonel WATSON: I was a little surprised at Sir Clements Markham mentioning my name in connection with this subject, because it is a good many years now since I have been in the upper Nile region, and I have not had the great advantage enjoyed by Captain Wellby of travelling through the country between the lower end of Lake Rudolf and the Sobat, but at the same time I feel, perhaps more than many here, the vast importance of this journey. One of the great questions of the future with reference to the opening up of Africa is the finding of a good route between the White Nile from Khartum and the countries in the vicinity of Uganda. Of course we have the White Nile itself, but it must be remembered that the White Nile from Fashoda, and from the mouth of the Sobat, where it turns west and again south-east, is a most disagreeable river. I have travelled on it, and know something of its navigation. It is sometimes blocked altogether by reason of the floating vegetation, which is known as the sudd, and which occasionally blocks the river for years. When I was with General Gordon at Gondokoro, we used to discuss the question of what was the best route from Khartum to the south, and used to express the hope that a road might be opened from the Sobat, and General Gordon thought this would do away with the difficulties of navigation. The country would be a good one to travel in, a far better country than that which borders the White Nile itself. Captain Wellby is the first man to show the great advantages of that route. He has shown that it is an easy country to travel in—that the people are good to deal with; and I believe that one result of this paper may be to direct the attention, both of people in this country and the Egyptian Government, to the great advantages of opening up that route; to divert their attention from the White Nile, to a road from the Egyptian station of Nasser to the south, which I believe some of us may live to see converted into a railway. I think it would be one of the best means of opening up the interior of Africa from Egypt to Uganda, and I hope when that day comes that we shall not forget that it was Captain Wellby who was practically the first to show the possibilities of this route.

Sir THOMAS HOLDICH: My own experience in Abyssinia is hardly such as to justify me in adding much to what we have heard from Captain Wellby's interesting paper. You are all aware that this is not Captain Wellby's first exploit. It is not so long ago that he crossed Tibet from west to east by a route which no man up to his time had attempted, and which has not been followed since. On the present occasion he had with him my well-tried old friend Shahzad Mir, who, if he makes as many tracks about Africa as he has made about Asia, will be the most travelled person in the world.

I would caution you against accepting what you see in this somewhat sketchy map as a fair criterion of the amount of geographical knowledge which Shahzad Mir brought back. Of course the most interesting part of the journey is that to which Colonel Watson referred—that part of the country which lies between the highlands of Abyssinia and the Nile. I am very pleased to hear that Captain Wellby considers this to be an easy country. I have always thought otherwise, drawing my conclusions from the paper read by Colonel Macdonald, but until we have complete knowledge—more accurate geographical knowledge, I think it may be a little premature to jump to conclusions about its real possibilities. I trust, however, that when Captain Wellby has finished with the more thrilling experiences he has just undergone, he will come back to us, and we shall have the opportunity of hearing from his own lips something more about that strange country, which must inevitably hold within it so many chapters of future history.

The PRESIDENT: The region which has so recently been traversed by Captain Wellby is one to which our attention has been turned for the last six or seven years, and is one of the most interesting of the unknown parts of Africa. We have had the journeys of Dr. Donaldson Smith, Mr. Cavendish, and others, in the southern parts of that region. We supposed, as Sir Thomas Holdich has said, that the country was exceedingly mountainous and difficult; it appears from the discoveries of Captain Wellby, that it is an open country well supplied with game and well watered. On the north of the Sobat there is, I believe, a still more interesting mountainous country in the districts of Enarea and Kaffa, south of Godjam, which I am anxious to see explored. Captain Wellby has made a magnificent beginning, having marched from the southern end of Lake Rudolf to the Sobat, and I am sure you will all wish to pass a very cordial vote of thanks for the paper which has been communicated to us, and a vote of thanks to Mr. Wellby for his kindness in coming here and showing the interesting series of views taken by his son.

CAPTAIN WELLBY'S MAP.—The sketch-map of Captain Wellby's journey from Addis Abeba to Nasser is reduced from his plane-table survey, and is intended only as a route map. Owing to Captain Wellby's unavoidable absence in South Africa, it has not been possible to obtain his assistance in the construction of a complete map.

THROUGH HAITI.

By HESKETH PRICHARD.

I LANDED at Jacmel, on the southern coast of Haiti, on November 16, 1899, my expedition being undertaken on behalf of Mr. C. Arthur Pearson for his new daily paper, the *Express*. I had been round the coasts of Haiti two years previously, and had been struck by the fact that, although it is situated in the centre of other civilized communities, and is itself supposed to be under the influence of civilization, yet locally no one seemed to know anything about the interior or the condition of the people. All sorts of wild stories floated about the neighbouring islands, but I could find out nothing definite. Even on board the West Indian liner on which I went out last year, a steamer that actually calls at Jacmel to land the mails about five times a year (and has done so for about twenty years), it was impossible to get any accurate information more recent than that contained in Sir Spenser St. John's excellent book, published a considerable time ago.

On all sides, however, I was assured that for a traveller to land casually at Jacmel with the intention of riding across to Port au Prince was an extremely risky proceeding. I was warned that the chances were strongly in favour of his never reaching the capital. These counsels, as is often the case, luckily proved to be entirely mistaken, for, apart from the risks inseparable from riding at night over a rough track, much of which ran along a river-bed, no danger whatever menaced me on my ride across the Tiburon peninsula.

Jacmel lies in a fold of green cliff on the edge of a beach, where the plunging surf breaks almost at the foot of the palms. It looks

picturesque enough from the sea, its white houses set amongst vivid green; but when I landed on the rotten black wharf and made closer acquaintance with its realities, I found other terms more applicable to it than picturesque! The streets are incredibly dirty, for the Haitian never dreams of either mending or cleaning them, and sanitary matters appear to be outside the range of his intelligence. Refuse of all kinds is simply thrown into the roadway and left for the sun to deal with.

But the place teemed with life; a noisy, vociferous crowd of negroes of all sizes and ages jostled each other through the dust and glare. Processions of under-sized donkeys, laden with guinea-grass, passed up and down amongst them. All was life and bustle of the idle sort. Empty walls scarred by fire marked spaces even in the principal streets. No one, except some negroes carrying coffee-sacks, seemed to have work—properly so called—in hand. Indolence, neglect, and decay had set their mark on everything around.

Although Jacmel is the chief port in Southern Haiti, no hotel or other available shelter for the traveller exists within it. I was indebted to the kindness of H.B.M.'s consular agent for food and lodging, and spent a short time in riding about the town and adjoining country. On the top of a hill near by there was electric plant, which I presume some enterprising member of the Government had caused to be purchased and put in position. But there the matter ended apparently, for it lies unused to-day. This fact is so characteristic of the ruling spirit of the country that I mention it.

Having secured a guide and a permit, I set out on my journey to Port au Prince. The guide, whose name was given on the passport as "Petit Sans-Nom," was a small man with the inevitable scanty goatee which distinguishes the Haitian negro. He was mounted on a little mule, which I found was meant to carry my baggage as well as the person of its master.

If you take a map you will judge the distance between Jacmel and Port au Prince to be about 25 miles, but when I tell you that there are between 120 and 150 fords to be crossed (the number varying with the seasons), and that the road turns back upon itself and follows the bends of the rivers, you will understand that the local estimate of the distance as being 68 miles is by no means excessive. There is no such thing as a road; a narrow track overhung by trees and creepers takes you down to the first ford. Thereafter you follow the river-bed as often as not. Luckily, the Haitian horses, small, long-tailed little beasts, are sure-footed, for we were still travelling when night came on, and the track had, if anything, grown worse.

We passed but few huts, and the province seemed to be comparatively thinly populated. At last we reached a hut which was to be our resting-place for the night. It was situated, with two or three smaller hovels, inside a stockade. Windowless and earth-floored, it had

very little more of convenience or comfort about it than the home of a savage. But the owner was the incarnation of the spirit of hospitality.

Before dawn we recommenced our journey by climbing the lower spurs of the mountain range which forms the backbone of the Tiburon peninsula, and before daylight reached the top of the pass, from which we could see the bay of Port au Prince on the north and the Caribbean sea to the south. The heat increased as we went down the northern slopes, but soon there were increasing signs of denser human habitation—huts shaded by mangoes and tamarinds, and shut in by bananas, near which naked children played and their elders lounged in the shade. After a hot ride across the plain, we at last arrived at Port au Prince.

The Black Man's capital, as far as cleanliness goes, is much as his other towns. The same gutters flowing along the streets, the same garbage and refuse strewn over every inch of road surface. The street itself, being absolutely out of repair, is a network of holes, inequalities, and pools. The heavy tropical rains flush them at intervals, but their condition between whiles is indescribable. The chief boulevards are overhung with trees. A steam-tram passes up and down to the harbour every half-hour or so. Military police occupy miserable guard-rooms here and there along the boulevards, and cook their food beside the sluggish drains which meander under the low piazzas, where the men play dice when they are not sleeping in the hammocks slung from the roadside trees. At the head of this thoroughfare stands the cathedral and the palace of the president, but neither of these buildings has any architectural pretensions. Altogether the city is unkempt and unclean. I have visited many other unpleasant towns, but Port au Prince is *facile princeps* as to filth.

After spending more than three weeks there, I started for an excursion into the interior. I determined to make eastwards through the plain of Cul-de-Sac, which is reputed to be one of the most fertile spots in the whole world, to the Dominican frontier. I started from the capital, passing under the triumphal arch of President Hippolyte, on which was the proud inscription, "Progress-Union," and shortly found myself on the way to my first stopping-place, Pompadette, a village of wattle huts.

During the days of the French occupation the plain of Cul-de-Sac boasted a large number of prosperous plantations. The estimated revenue drawn from this region alone is said to have amounted to twenty millions of francs, though at the present time it cannot be supposed to produce as many thousands. The plan itself is, roughly, 27 miles by 24, Port au Prince lying on its western edge, and although the harbour there holds ships from every quarter of the world, and should present a ready outlet for the wealth and produce of its hinterland, the actual commerce of the port is at a miserably inadequate level.

Many reasons could be adduced for this: the absolute lack of all means of communication, for the road by which I travelled—which had once been a handsome highway some 60 feet wide, made by the English in past times—has now degenerated into a bog during the wet season, and during the dry into a series of ridges and hollows and ankle-wrenching holes. The spacious country houses of the French colonists have long ago been devoured by the encroaching jungle. The only living things to be seen beside the owners of the soil were droves of lean pigs, which wandered about picking up a precarious living upon the land that the tropical vegetation has reclaimed from the dominion of man.

Here and there in the course of the day clusters of huts broke the desolate lines of forest. They were primitive enough, these huts, encircled by stockades. The people are very poor—sordidly poor—eking out their living much as the pigs do, upon wild fruits, which they are too idle and too improvident to cultivate. They still pick berries from the coffee-shrubs planted by the French colonists in the old slave days. For the rest, mangoes and bananas afford them provision for the best part of the year. Their huts are mere elementary shelters, many with ruinous thatch and practically guiltless of anything in the way of furniture. The live stock, fowls, guinea-fowl, and pigs, fight for chance refuse of food on the earthen floor, while the most precious possessions of the owner, a couple of gamecocks, are carefully tethered in a corner.

Altogether, however, I came to the conclusion that the happy-go-lucky existence of the people is not without its compensations. They have absolutely no care for the morrow, and they seem light-hearted folk, always ready to take part in the amusements common to the country, dancing and cock-fighting. The measured beat of the drum, which means that dancing is in progress, may be heard very frequently as one rides along those lonely forest ranges, and I have often come upon a solitary figure dancing away by itself in some green shaded nook. I found a cockfight going on at Thomazeau when I arrived there, and the public interest around was evidently universal and enthusiastic.

I had difficulty in procuring any food: the only available provision appeared at first to be pork, but I was by that time far too well acquainted with the scavenging habits of the slab-sided pigs to feel any relish for that particular comestible. However, I managed to procure biscuits of bread and sickly gluey cakes with seeds on top, upon which I made a good meal at the house of the magistrate of the village, who courteously put his hut at my disposal.

This was not the first time I made experience of real Haitian hospitality, and it was by no means the last, for the people in the interior, though exceedingly poor and primitive in their habits, were extraordinarily kindly and hospitable, ready to give shelter at all times, and food, if they possessed any, which in many cases they did not. Payment

afterwards, far from being expected, was often resented, and one had to manage by some small gift, tactfully offered, to repay the hospitality received.

The day passed pleasantly, riding through the forest land upward towards the mountains which form the Dominican frontier. The lower hills were round-backed and heavily wooded, and the bridle-path presented many difficulties in the way of sudden drops or declivities covered with sliding stones underfoot, while overhead one had to dodge hanging creepers and branches, most of which seemed quite unnecessarily to be furnished with thorns.

The farther I went, the more sparsely scattered were the little groups of huts. And wherever a clearing in the trees told of the presence of man, I soon began to expect one unalterable characteristic. Whatever owes its origin to human handiwork is fast falling into decay and ruin, while nature, fresh and vigorous, is always advancing her outposts to the verge of each little circle and plot where the frail ragged dwellings hold their own like forlorn hopes, which may at any time be ruthlessly smothered in the living green of riotous foliage.

A negro, if driven by necessity, may make a thing, but he seems, constitutionally, unable to force himself to mend it. The villagers in the far interior are, in fact, little more than savages. Education has never reached them; they lead a life dull and squalid beyond imagination. A fire smoulders under the four-legged toadstool roof, where the cooking goes forward when there is any; the patriarch of the community suns himself in senile enjoyment, and the other dwellers of the stockade lounge or squat about the enclosure in a dream of existence which has no aim, nothing even so much as to mark the days. People used to come to me at my stopping-places to show me sores and ask me to cure their various diseases, but on the whole, the community appeared to be healthy—wonderfully so, considering their habits and their neglect of sanitary precautions. The luxuries of life are unknown, and dress, save on a journey, has almost become a superfluity.

Farther and farther I rode into the doublings of the mountains, until the early morning found me above the Laguna de Fundo. The forest thinned away to more open country at that spot, and a wind bearing with it the smell of the marshes about the lake blew up the mountain-side. Yet the air was clear and bracing, and the scene marvellously beautiful. All around from the peaked summits to the water's edge the trees spread in an unbroken sea of green, a living wealth of timber. But few trees are ever felled here; a very small proportion reach Port au Prince for export, the absence of roads or any means of transport beyond human porterage putting a decisive check upon enterprise in this direction. Yet the possibilities are enormous, as will be seen from the following extract taken from a short paper written for me by a Haitian gentleman with regard to the resources of the island.

"Haiti is a fertile country. It possesses large virgin forests full of very precious woods, land not yet cultivated and capable of yielding the most varied productions, from those of the tropics to those of the temperate countries situated in the heart of Europe. The soil is rich in minerals: one finds iron, copper, gold, sulphur, granite, marble, cat's eyes, antimony, and lead. They say that at Tortuga, an island opposite Port au Paix, there are rich deposits of guano."

ROAD TO TURGLAN.

The mahogany grown in Haiti is peculiarly fine, and enormous quantities are waiting for the opening up of the country, while at the present moment the case stands much as it did in 1898, when the Consular Report contained the following. The export of mahogany from the island was massed with six other items under the remark, "Not of sufficient importance to be quoted"! Haiti is at once perhaps the richest and poorest country for its size in the world.

All about the vicinity of the lake I found traces of the old mansions of the French colonists, but they are scarcely more than knee-high ruins

now. It is just the same all over Haiti wherever you go; all that white energy, industry, and intelligence once initiated and carried on has, since the disappearance of the white man and the ascendancy of the black, practically dropped out of being. All that the white races left behind as milestones on the path leading from savagery into civilization has, from sheer waste and idleness on the part of the present occupiers of the land, been obliterated. As far as the condition of the interior is concerned, the position in the present day is retrogression as regards the human element, and absorption by the forest powers of once cultivated lands. Here you are among a people who by right of race appear to prefer a thatched hut to a palace. At a distance of a very few yards from a stockade you are scarcely aware of its existence, hidden away as it is behind the ingrowth of rank vegetation.

The land is very empty. Animal life is scarce in the Republic. Of course there is no large game, but on some of the larger islets round about its shores cattle have run wild for generations. In the far interior I saw wild dogs and pigs which had escaped from the yoke of mankind. It is always easy to determine the status of the casual pig one meets in Haiti, for the domesticated breed have a heavy triangle of wood slung round their necks to keep them from wandering far. There are not many reptiles, and bird-life is not plentiful. In the neighbourhood of the Laguna de Fundo, I noticed the extraordinary tameness of the birds, which is probably due to the fact that little shooting of this kind is done in Haiti. There are very stringent rules in the country districts, and the hand of the local general is heavy, and any negro sportsman without a permit would run an excellent chance of arrest under suspicion of being concerned in the hatching of some revolutionary plot!

In a defile more than usually lonely and wild, the frontier guard challenged, and the two ragged soldiers who composed it unslung their rifles and demanded passports. A little tumble-down guard-house stood on the cliff above, in a little recess hacked out for it among the trees. It was merely an open shed, and the men came halfway down the bank, glanced perfunctorily at our papers, and before we were out of sight, had sunk back upon their haunches beside their smouldering fire. Meanwhile we were over the border and in the Republic of San Domingo.

At one time the Laguna de Fundo belonged to Haiti, but now half of it is claimed by the government of the sister republic. The water of the lake is brackish, and during times of heavy rain is connected with the larger lake, Enquirillo (which lies entirely in Dominican territory), by water lying in the lowlands between. The climate in this part of the island is delightful, the air fresh and balmy, but on both sides of the frontier the country is practically empty. The chief trail—for it is no more—which lies between the republics is little travelled. A few natives cut timber beside the lake, a few fly from justice, and a rare

farmer in gamecocks crosses the border to find a new market, that is all. The parrots that fly above and the wild pigs that roam below form the bulk of the wayfarers to be met with on the highway between San Domingo and Haiti.

On the return ride to Port an Prince I travelled mostly by night, and happened to come upon the wind-up of a Vaudoux sacrifice, or orgie, whichever one chooses to call it, in the heart of the forest. The people were dancing frantically round a fire, and we stopped and looked on, but no one took the slightest notice of us, so absorbed was the whole crowd in a storm of unseemly swaying, droning, and dancing. The practice of Vaudoux, with its attendant horrors, touches a very vital point in the history of the Haitian negro, but I will refer to that later.

The impression made upon the traveller by the physical conformation of the country is one of bewilderment. Hills upon hills, all shaggy with woods, tossed together in a chaotic jumble, and slashed deeply in all directions by gorges and ravines. The all-pervading greenery is of a deep potato-leaf tint, lit here and there by the pale vivid colour of broad-bladed banana leaves. There is another particular about the country which cannot fail to strike one. A hundred years ago man had conquered nature; now nature has regained her own, and conquered back her lost possessions.

Later on I visited Cap Haitien. This was once upon a time a flourishing place, and called the "Little Paris of the West." In the various ruins which still remain one can trace the relics of a well-built and handsome town. The great earthquake of 1842 began its destruction, and neglect and general decay are quickly wiping out all that is left of it. But mushroom dwellings of wood have sprung up everywhere amongst the ruins. In spite of the disappearance of the older stone-built buildings, the town itself is the cleanest I saw in Haiti. The northern provinces appear to be endowed with a certain amount of energy and industrial enterprise. The labourers on the quays went at their work with vigour, and altogether one noticed an air of business and movement which is not observable elsewhere.

From Cap Haitien I started towards the citadel of La Ferrière, a massive and ruinous pile of masonry set upon the top of one of the mountains which command the plain beneath. It was built in the early part of the nineteenth century by the Emperor Christophe, as an impregnable fortress in the case of war or revolution. They say that the emperor was in the habit of driving up to the citadel in a carriage, but it is hard to believe that he can ever have done so, as for the greater part of the distance no trace of a road remains. The government are very jealous of allowing travellers to visit La Ferrière. The reason for this is, I believe, that the enormous treasures said to have been amassed by the Emperor Christophe are supposed to be buried somewhere inside the gigantic monument of his extraordinary energy. This

Christophe united in himself a ruthless energy of will and action that drove all before him, conquering even the supineness and indolence of those of his own race over whom he had made himself master. He rose from being a waiter in a *café* to the position of dictator over the northern province of Haiti. In spite of the savage cruelty of his nature, he showed a truly kinglike passion for fine architecture and noble buildings. His palaces of pleasure are scattered over the country, notably Sans Souci, which lies on the way to La Ferrière, and overlooks the village of Milot.

From the present condition of Sans Souci, it is possible to deduce some very essential peculiarities of Haitian character. If you compare the description of the palace as represented by Hazard in his book on Haiti, written many years ago, with the condition of the ruin as I saw it, you cannot fail to be struck with the fact that the negro appears to have a racial preference for hovels, or at the best ill-built and inferior buildings. Here is a splendid mansion surrounded by gardens and open to occupation. But it does not seem to appeal to the Haitian. In the days when Hazard visited the country, it was in fairly good preservation and apparently habitable. To-day it is a ruin, a mere skeleton of walls, tenanted by the lizard and the wild bee.

But the fortress of La Ferrière is one of the sights of a lifetime. A huge big solid mass of masonry, streaked with red mosses, rearing its grey front upon the summit of a cloud-hung mountain. Inside it there is little save damp old smells; the woodwork is rotting, nothing but the gigantic shell of the place is intact. Human foot seldom crosses the threshold, and obsolete cannon, some of them covered with stalactites, lie heaped in the corridors. The Général de la Place at Milot, Anahim Amazan, was good enough to give me a soldier as guide, and I own to the fact that I have never been so impressed as when first an opening in the forest which clothes the mountain-side gave me a view of this gigantic deserted citadel, towering up from the summit of a mountain 4000 feet above the sea, a great cavernous empty place with its useless armoury of three hundred guns of position.

The alternations of climate on the summit of La Ferrière are remarkable. I had not arrived under the walls when the whole surroundings, bathed but a moment before in yellow tropical sunlight, were blotted out by a blinding mist of rain. Five minutes later the cloud was flying to the horizon, leaving us steeped once more in warmth and sunshine. Later, as we stood in the great hall, the light suddenly went out, and volumes of rainy fog came belching in at the window-openings. We stood in a half-darkness for a few moments, chilled to the bone by a piercing wind, but after a wild splash of rain the sky cleared and the sun shone once more.

In the heart of the deserted fortress is the tomb of Christophe. Jungle and guinea-grass have grown up in the enclosure, through which

we had to push our way to reach the tomb. It has been violated, and my guide thrust in his hand and plucked out ancient bones for my inspection, which, according to his story, were ribs and finger-bones of dead Christophe, the most terrible tyrant whom Haiti has ever known.

After spending some time at Cap Haitien, I embarked and visited various ports all round the island. I returned to Jamaica in January.

II.

There is no other country with a pretence of possessing civilization where such a cult as snake-worship, or Vaudoux, to give it its local name, could exist save Haiti. The reasons are twofold: the racial proclivity of the negro to delight in mysterious and hyper-emotional ceremonies which degenerate into orgies, and the ignorance in which the majority of the community are steeped, and which it seems to be the policy of the government to foster rather than overcome.

There can be no manner of doubt that Vaudoux is merely a survival of the savage beliefs which the negroes, imported as slaves during the period of the French occupation, brought with them from the shores of Africa. Kindred ideas and practices are, as is well known, to be found among the natives of the West Coast at the present day, as well as to a small extent among the negroes of Jamaica and other West Indian islands, and they are also entertained in secret by the black section in the Southern States of America. The chief difference is that in Haiti the people are their own masters; black is the ruling colour, and the peculiarities of the race have there full opportunity for unchecked development.

So in Haiti Vaudoux flourishes exceedingly. There are said to be two sets of Vaudoux worshippers: one which sacrifices fruits, white cocks, and white goats to the serpent-god; the other, a far more dangerous and sinister cult, the lesser ceremonies of which call for the blood of the black goat, and whose ultimate rites can only be carried out by the sacrifice of the "goat without horns," a euphemism for child-sacrifice. White is the sacred colour of the former and more innocent sect; red that of the latter. But my own personal experience leads me to believe that the two divisions, those who sacrifice under the white and those whose ceremonial colour is red, not infrequently mingle in actual practice.

This is, I am aware, not a generally received opinion, but it happens that on one occasion I was lucky enough to witness a function where the flags and handkerchiefs used were both red and white, pointing to an intermixture of the two forms, and the cocks sacrificed were both black and white, again bearing evidence in the same direction.

The Vaudoux ceremonies usually take place at night and in pseudo-secrecy, but the worshippers are practically free from all hindrance or interruption on the part of the authorities. The function is presided

over by the snake in its box, but I had no glimpse of the reptile, nor have I ever met with any white man who had been permitted to see the "god." The rites consist usually of dancing, sacrificing, feasting, invocation, and a Delphic delirium on the part of the Mamaloi, or priestess, the whole winding up with scenes of an indescribable nature.

Testimony as to the order observed in Vaudoux ceremonies differs. By "ceremonies" I refer to the actual rites of sacrifice, which lasted, in the instance I describe, four hours. The whole rites lasted from noon on Thursday till dawn on Sunday. Each man, no doubt, describes what he has heard. But, for my own satisfaction, I noted down on my cuff the sequence of the rites as they took place before me on the occasion of a large Vaudoux gathering at which I was present, and when six cocks were sacrificed. The following is a copy of my notes:—

Dancing to a monotonous song.

Sprinkling water over feast composed of Congo beans, red melons, and various bottles of liquids arranged upon the ground and ornamented with pink flowers.

Mamaloi danced up and down a lane between knees of worshippers, laying a living cock upon their heads.

Mamaloi killed the cock, kissed the twisted bleeding neck, and flung the cock over her shoulder, after which she fell down apparently insensible.

Dancing recommenced, and other cocks were sacrificed in the same manner, but by different persons. The Papaloi sacrificed a black one last of all.

Sprinkling water on the sacrifice.

Blood of chief sacrifice now placed in a bowl by itself, and with it the Mamaloi anointed the doorposts, and made crosses in blood upon the foreheads of the initiated.

More dancing, in which people began to join.

The feast.

Again dancing, which gradually degenerated into lasciviousness.

Not the least prominent feature of Vaudoux is the drum which calls the initiated together, and without which no ceremonial takes place. I examined one, which was about 4 feet high; others of a smaller size are also used. To return to the one I have alluded to above, the frame was of some jointed wood like bamboo, and the girth about that of a man's trunk. The skin used was that of a black goat, the hair still adhering to the edges where it was fastened to the frame, but the centre had been worn thin with the thrumming of many fingers. These drums are so singularly constructed that, although at a distance they sound loudly, near by their throbbing call is indistinct and low. Where the negro picked up this secret in acoustics it is hard to imagine. But the peculiarity has an important meaning. A sect with rites like the Vaudoux have naturally urgent reasons for desiring that none but the

initiated should be present at their gatherings. Hence the low muttering close at hand is calculated to mislead the listener, whereas the initiated, who have warning of the function about to take place, hear the beat at really wonderful distances, and at once proceed to the appointed spot.

The evil of Vaudoux is widespread in Haiti, although the nominal religion is Roman Catholic. The black government has at all times been too weak to seriously oppose so powerful a combination. For the Papalois, or priests, are a living force which has to be counted with in politics as well as in private life. The Papaloi is not only a high priest; he is also a consulting physician. He can cure, he can kill, and the two are often very curiously allied in his practice. He can put you in the way of accomplishing the most cold-blooded revenge on your enemy for a consideration, and he will also provide you with a love-philtre. If you have been poisoned, he will heal you in all probability by means of an antidote. He is unsurpassed in his subtleties of secret poisoning. He can take away your reason with or without pain, or he can induce a loathsome disease to attack you. Nor must it be supposed that the white man is outside his reach. Many now living in Haiti could tell you so.

No priesthood has so strong a grip of the savage mind as that which trades on solid fear, and can also lend its aid to the fulfilment of the earthly passions of its devotees. The Papaloi can do all this. He is the pivot on which Haitian life in the wilder districts moves. Snake-worship, child-sacrifice, cannibalism—the Papaloi is at the root of all these things, and will continue to be so, degrading his country and his race, until some power arises in the land formidable enough to crush him. Haiti can never be other than she is unless that happy event comes to pass.

Looking back upon my time in Haiti, I cannot regard my wanderings in the country districts with anything but pleasure. The negro, when away from the influence of the coast towns and civilization, is a kindly, inoffensive person, liable, of course, to the plunge back into savage superstitions and practices, which seem to touch some incurable susceptibility of his nature; but, apart from these intervals of delirium, I found him in Haiti well disposed, and, as I have said before, the soul of hospitality. Notwithstanding the warnings and unfavourable prophecies poured upon me before I started, I travelled through the interior without meeting with the difficulties and opposition that are certainly supposed to attend the wayfarer in his journeyings there. I trusted entirely to the natives for food and shelter, and, although food was scarce—because of the poverty and idleness everywhere present—I was always offered what there was to be had with politeness and at no very exorbitant price. On one occasion my water-bottle was poisoned. What offence I had committed to merit this I do not know.

Haiti is astonishingly healthy when one considers the absence of all and every attempt at sanitation. Of course there is a good deal of fever, especially during the malaria seasons; but the country is not very swampy, and I am inclined to think that fever is less common there than in many of the other West Indian islands. Yellow fever is not endemic, though cases occur in the ports pretty constantly, the contagion being brought in from other places. Small-pox is rife, and no measures are taken in the way of inoculation or enforced cleanliness to combat the spread of the disease. But, on the whole, in spite of many drawbacks, Haiti appeared to me to have an excellent climate, far more balmy and pleasant than that of any other island with which I am acquainted in those seas. The basin of Port au Prince, cut off as it is from the cool northern breezes, is very hot and enervating; but the Cape, the mountains, and higher ground offer various gradations of agreeable climate and balmy air.

The traveller in the republic must, however, be careful to provide himself with passports, for the rural districts are ruled over by fierce black generals whose will is absolute locally, and who have no hesitation in sending the stranger off to prison as a suspicious vagrant! Now, the prisons of Haiti are appalling places, where the unlucky prisoner is almost certain to fall a prey to some disease. They are overcrowded and filthy to an inconceivable degree. An open yard with sheds round it and a cesspool in the middle, which is never cleaned, is the prevailing model, while the prisoners are expected to buy their own food; and as to medical attendance for the sick, I neither saw nor heard of any adequate provisions for the only too likely needs of the prisoners. It will be seen, therefore, that a Haitian jail is a place to be carefully avoided. As long as you steer clear of the law and its representatives, you can move about comfortably enough through the country, but it is far easier to get into trouble than to get out of it again. Of course the foreigner's consul will be ready to back him up in case of necessity, but in the remote districts, and indeed in many towns on the coast, the consular power is distant and not readily made effective, for the negro in authority is a very great man indeed in his own eyes, and likes to taste the pleasure of putting the white into jail, not to speak of the fact that to the black man's mind force has to be near and visible to become convincing.

It will be remembered that in Haiti the traveller is in a land where black rules white, and the white has really only such rights as his consul can oblige the government to recognize by sheer weight of the power behind him. Justice is not to be relied on, for the negro takes it as an unpatriotic act if any judge even seems for a moment to incline in favour of any white man who appears before him, no matter what good faith and fair play demand. Besides, the government is in chronic opposition to the foreigner. The white element brings much of such

prosperity as Haiti enjoys, but the white individual is not a welcome guest, for he is apt to want to open up the country; he has prejudices in favour of education and sanitation and other troublesome things, so that on the whole the government combine in regarding it as good policy to keep him strictly within narrow bounds.

There is a future for Haiti, but the time is not yet. The riches of the country are entirely undeveloped, probably to a great extent even unknown. The government, following out its traditional policy of "Haiti for Haitians," will not permit foreign interference or enterprise to reach beyond the fringing towns on the coast, and the people themselves are too indolent and too lacking in perseverance to do more than talk about possibilities, and very occasionally to initiate some project, which, however, invariably falls through at an early stage.

NEW LIGHT ON SOME MEDIÆVAL MAPS.

By C. RAYMOND BEAZLEY, M.A.

IV.

NEXT among the examples of mediæval cartography, prior to 1260, which have been recently studied with such excellent results by Konrad Miller, we may take—(1) The Maps of Matthew Paris; (2) The 'Situs Hierusalem'; and (3) the 'Madaba' mosaic map.

I. In the earlier thirteenth century the monastery of St. Albans possessed what we may call an historical school, or institute, which then, as in the twelfth century, was the leading English centre of this kind of study, and with different environment might have become the nucleus of a great university. Among the writers of this school the greatest was Matthew Paris (1195–1259), who left three works of high importance for English history: the 'Historia Major,' or 'Cronica Majora;' the 'Historia Minor,' or 'Historia Anglorum;' and the 'Historia Sancti Albani.' Beside their general value as chronicles, these writings are of special interest as containing various maps and plans, which must be ranked among the best ever produced by mediæval geographers, before the rise of true scientific cartography in the 'Portolani.' Thus, in the 'Historia Major,' we have the so-called 'Itinerary to the Holy Land,' or 'Stationes a Londinio ad Hierosolymam,' as well as a mappemonde,* a map of Palestine, and the first of Matthew's four 'Maps of England.' Again, in the 'Historia Minor,' there is another form of the 'Palestine Itinerary,' the second and third maps of England, and the 'Situs Britanniæ.' Lastly, in the 'History of St. Albans,' a portion of

* The Cambridge and London manuscripts give two slightly different forms of this. Cf. Cambridge C.C.C. MS. xxvi., at end of vol., and B. Mus. (Cotton) Nero D.v. fol. 1.

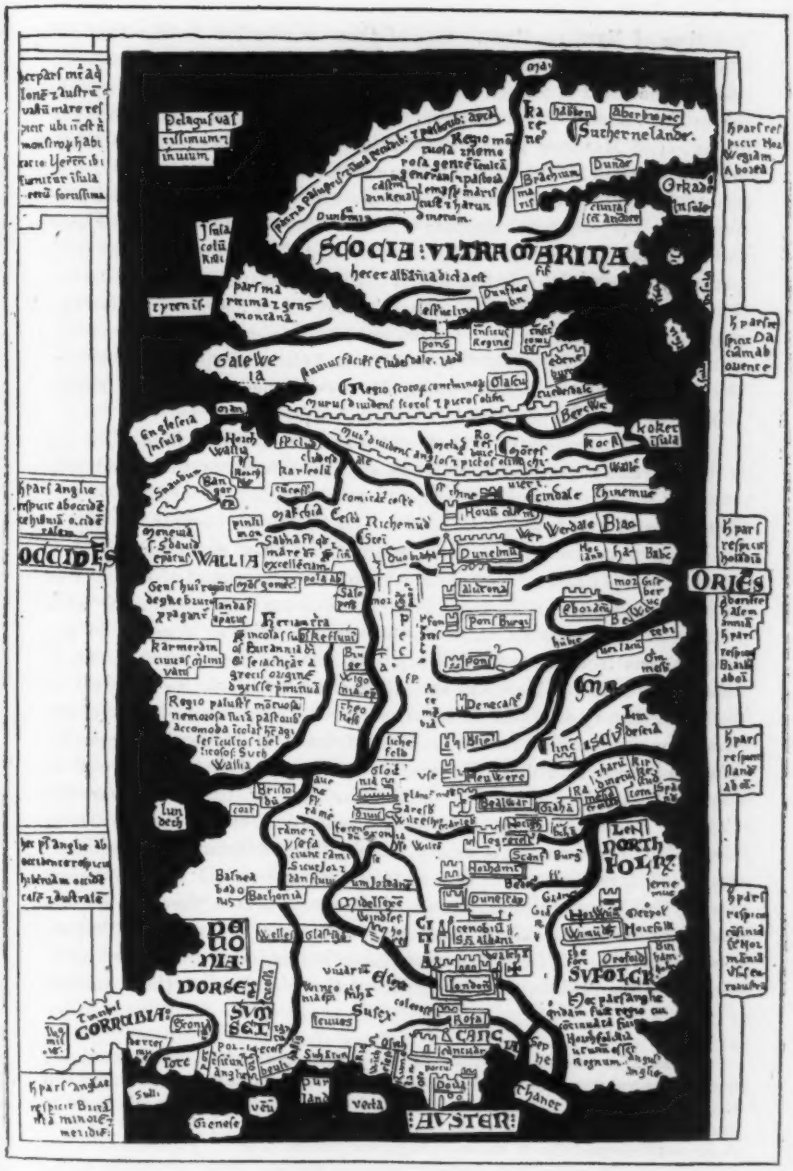
the supposed "Pilgrim road," as far as Italy, is given in another shape, together with the 'Schema Britanniæ.'

Altogether, then, the manuscripts of Matthew Paris give us six geographical designs: a world-map, in two (slightly differing) copies; a map of England, in four variants; a purely conventional sketch of the Heptarchy in the form of a *Rose des Vents*, and with the title of 'Situs;' a plan, or *Schema*, of the Roman roads in the same country; a 'routier' to Apulia, from the English court; and a map of Palestine, which tradition has wrongly joined with the former, to make a 'Pilgrim Itinerary' from London to Jerusalem.

These works, among all the maps of purely mediæval origin, show the greatest evidence of independent and scientific study. Elsewhere we have seen traces of comparative enlightenment, but in Matthew Paris' maps of England we meet with a more systematic attempt at the detailed and exact delineation of a certain area of the Earth-surface. They are, in fact, praiseworthy examples of what Ptolemy called *Chorography*, and they would be even more important but for another consideration. At the very time that the English chronicler was draughting these plans, compass-maps or scientific coast-surveys were beginning in the south of Europe. In comparison with these Portolani, Matthew's work falls into a secondary place; for at his best the English geographer was only working from description, hearsay, book-knowledge, and approximate determinations. The only basis of true geography, the fixing of terrestrial positions by celestial observations, was first given us on an adequate scale by the new school of Mediterranean pilots and draughtsmen. Again, it was only by extreme minuteness of detail, a minuteness but dimly realized in classical or mediæval designs, that the true chorography (the real beginning of modern survey-work) could be attempted; and the Portolani first supplied this want by the labours of practical mariners.

All this was beyond the range of Matthew of Paris; but the monk of St. Albans came nearer to the standard of the scientific map than any other of the student-geographers of the middle ages. His best work, as we have seen, is not in his general scheme or mappemonde, but in his sectional map of England.

(*a*) The mappemonde, however, is a thing of some value, showing a curious independence of all other mediæval designs. The London and Cambridge forms of this differ slightly, as, for example, in the far east. The London copy measures 33·8 by 23·6 centimetres; most of the writing is coloured red, except the Mediterranean names lying east of the Adriatic, which are black. The mountains are given in ochre, the rivers generally in blue; the Mediterranean sea is green. The legends on this world-map number seventy-nine; the most interesting of these is that in the neighbourhood of Mount Taurus, which alludes to the three large wall-maps existing in London and the neighbourhood at



23. Dritte Karte Englands von Matthaeus, in London.

MATTHEW PARIS' MAP OF ENGLAND: FINAL FORM.

the time of Matthew Paris. One of these is ascribed to the hand of Robert of Melkeley; another is called the mappemonde of Waltham, in Essex; the third is termed the property of the Lord King, and said to be in the Court at Westminster. This last had been figured by the direction of Matthew Paris himself,* and perhaps the same authorship may be assumed for the Waltham map. Prof. Miller suggests, with much plausibility, that some features of these lost wall-maps have been preserved in the fourteenth-century work of Ranulf Higden. Their size naturally recalls the scale of the Hereford and Ebstorf designs; but they probably belonged to a better school of draughtsmanship than the latter. Yet, compared to Matthew's England, his surviving mappemonde is a disappointment, and if we were to assume, with Miller, but against probability, that his wall-maps at Westminster and elsewhere presented merely the same features on a larger scale, there would be less reason to regret the loss of these 'Orbes picti.'

The chief peculiarity in that picture of the world, which, after all, is but partially shown on Matthew's mappemonde, is the broad arm running west from the Black sea, and perhaps intended for the Danube. The Maeotid marshes, or sea of Azov, in the far north-west, are represented as near the Arctic ocean, with which they communicate by a river or strait; almost the whole length of the continent of Europe lies between them and the Euxine. Many unnamed rivers appear; the term of *Adriatic* is extended, in a characteristic mediæval manner, to the Levant seas from Tyre to Sicily. The text has some resemblance to that in the maps of Hereford and Ebstorf; a little also to Lambert of St. Omer, Henry of Mainz, the Psalter, and the Cottoniana. Most of the newer names may be found in Ebstorf, such as Holland, Burgundy, Flanders, Austria, Poland, Venice, Bavaria, and 'Teutonia,' as well as some places like 'Jerapol'† in the far east of the map near the Caspian. But the great mass of place-designations is ancient; even 'Dacia' (for Denmark) is really an old form misplaced by mediæval usage. The curious corruption of 'Braibe' for Brabant is worth notice among the distinctly later names. Taken as a whole, the form of this map does not allow us to make it a derivative of any other known example. Henry of Mainz has some resemblances in his drawing of Italy, of the Baltic peninsula, and of some of the islands; but these amount

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* Some think this example was hung or painted in the Exchequer. Matthew's words about the three maps are, "Summatim facta est dispositio mappa mundi magistri Rober. de Melkeleia et mappamundi de Waltham. Mappamundi dni. Regis est in camera sua apud Westmonasterium, figuratur in ordine Mathei de Parisio." As to its shape and the conception of the world suggested, Matthew adds, "Figuratur in eodem ordine quasi *chlamys extensa* (a favourite classical simile). Talis est schema nostræ partis Habitabilis scilicet quarta pars terræ quæ est triangularis fere; corpus terræ sphericum est."

† Hierapolis.

to very little. Perhaps the chief thing to remark about this work of Matthew's is its limitation. It is not really a map of the world, but a sketch of Europe and the adjacent coasts; only the extreme northern edge of Africa is portrayed; as to the parts of Western Asia which are sketched, the author has so little intention of working them out in proper map-form, that he covers most of the space with the famous inscription just noticed about the three wall-maps. Even the Europe of this example cannot be regarded as a finished piece of work; its northern coast is absolutely straight, and apparently follows the requirements of the parchment sheet without any attempt at the representation of the true shore-line. The western coast is little better; England, which Matthew really knew something about, is entirely omitted; and, indeed, it would be difficult to rate the compiler's geography at a high level if we only possessed this design, and could not also refer to his four maps of England.

(*b*) These last, in their principal forms, at Cambridge and London, are the best specimens of mediæval student-geography, and both the Cotton copies are probably from the annalist's own hand. The Cambridge example, which we may treat as a first draft of the second London copy,* is only a fragment, though a considerable one; the lower third of the leaf has been destroyed, but what remains would be very valuable if we had not the Cotton examples as well. Some peculiarities of the Cambridge design seem to warn us against treating it (as some would do) as a mere copy of those in the Cotton collection. The first British Museum example, in the King's Library, is but a rough sketch containing little more than half the names of the ultimate form. Its execution is careless, and altogether it stands on a humbler level than any one of its chief parallels. On the other hand, the workmanship of the Cambridge and Cotton examples† shows the closest resemblance. The last named are in every respect the most perfect type of Matthew's England; the execution is surprisingly good, and in some parts suggests modern accuracy, especially in Wales, Devon, and Cornwall, in the East Anglian peninsula, in the Humber estuary, and in the line of the Severn.‡ The Thames, however, whose general size is well conceived, is misdirected and twisted round so as to flow into the southern sea or English channel. Matthew's knowledge of Scotland is of course vague; he thinks the firths of Forth and Clyde absolutely divide the land, so that *Scocia ultramarina* is only united

* The Cotton example in MSS. Claudius D. vi. fol. 8, which is, of course, the best of all. The second best is in another Cotton MS., Julius D. vii. fol. 50–53, somewhat damaged at the margin, but mostly intact and of admirable execution.

† The measurements of the Cambridge Map are 23 by 23·5 centimetres; of the King's Library copy, 25 by 33 centimetres. The latter is coloured black, except the sea, which is green.

‡ As to the Welsh shore-line, the peninsular character of this land of Wales, and the curve of the Severn, the Cambridge copy is even better than the Cotton examples.

to the southern island by a bridge. The Orkneys are placed in the north-east, following the trend of the shore-line of *Scotland Oversea*; but this deflection is much slighter than in Ptolemy, and only occurs in the best copies, the King's Library example being entirely free from it. Both the Roman walls are given, coloured yellow like the mountains; the sea on the west and east of Britain is green, like all the bays, gulfs, and lakes; to the north, the ocean, "most vast and impassable," has been left uncoloured; the rivers are blue or red, like some of the shire-divisions; while place-names and inscriptions are by turns red or black.

Within a space measuring 33·8 by 22·3 centimetres, an enormous amount of detail has been crowded. As to the contour, it is so good that any one at the present day would recognize it as pretty near the truth; the orientation is also remarkable. For here we have, for the first time in Northern Europe, a map with the *north* at the top and the east to the right; and in this we may see a victory of revived scientific feeling over the ecclesiastical preference for the *east*, and of North-European feeling over the Arabic and 'meridional' influence which had made the *south* the primary cause of the heavens. But the Ptolemaic arrangement, now reproduced by Matthew, was also better adapted for a sketch of the long and narrow island of Britain tapering towards the north,* and hence perhaps its victory in this instance.

(*c*) The 'Situs' and the 'Schema (Britanniæ)' are works of much slighter interest; the former has been already noticed, and needs no further attention; the latter, though merely a sketch of the four chief Roman roads of England, is peculiar in its orientation, Britain being, as it were, placed on end, with the *west* at the top. The Watling Street, the Fosse Way, and the Ermin and Icknield Roads are made to intersect at Dunstable.

(*d*) Matthew's 'Itinerary from London to the Holy Land,' as it is called, with which has usually been reckoned his map of Palestine, concludes the examples of this writer's draughtsmanship. But the Itinerary does not really exist as a connected whole; it is only the result of combining two parts which are not always in exact agreement. On one side we have, in various manuscripts of Matthew, a pictorial representation of the chief stations, or stopping-places, between London and Apulia in Lower Italy; these stations are all figured in sections from north to south, the chief rivers and mountains to be crossed *en route* also appearing; on the other side, we have a map of Palestine with the east at the top, entirely agreeing with the customary delineations on mediæval world-maps. The latter has really no connection with the former, except that both are by Matthew Paris, that

* It may be noticed that the Anonymous Geographer of Ravenna (seventh century) claims to have composed a special map of Britain, as well as his mappemonde, and this also is said to have had the north at the top.

both are of almost the same date, and that both are written in Old French intermixed with Latin.

But if the Itinerary to Apulia cannot be explained as part of a Pilgrim Guide to the Holy Land, what is its origin? Probably as follows. On St. Martin's Day, 1252, one Master Albert appeared at the English Court, and offered to Earl Richard of Cornwall the kingdom of Apulia on behalf of Pope Innocent IV., titular overlord of that realm. The Earl himself looked on the gift as a "dominion in the moon;" but his brother King Henry III. and the English court party were eager to accept the offer; and this itinerary was probably composed during the abortive negotiations on the matter. Its object was, therefore, political rather than religious, for it aimed at fomenting and informing English ambitions as directed on South Italy. This is further shown by the fact that the Itinerary proper only reaches as far as Rome; at this point it takes a new departure, and portrays the Norman lands south of Rome (the *Pouille*, or Apulia of the map) in a detailed form, enumerating all the greater towns. No list of stations is given from South Italy onwards to the Holy Land, and it is pretty clear that none was intended. Two inscriptions of interest occur; against *Pouille* the whole story of Pope Innocent's offer is recorded; another legend at Trapes,* in Sicily, tells how the same Earl Richard of Cornwall called at this place on his return in 1241 from a crusade.

(*e*) Matthew Paris' map of Palestine, so naturally, if mistakenly, connected with the Itinerary just noticed, is in some respects parallel to the smaller Jerome map. Both have Palestine in the middle and Egypt on the right; both make the east the primary quarter; but in their details they are very different. For Jerome gives us ancient names throughout, while Matthew Paris inserts many indications of thirteenth-century nomenclature and history (*c.* 1250). The author adds some vague marks of roads, a picture symbolical of Syrian trade, and sketches of the fortress-enclosures of various western corporations in Acre. The chief of these are the Templars, the Hospitallers, the Teutonic knights, the Genoese, and the Pisans; and this assignment exactly agrees with the position of things in Matthew's time. For Acre was now (1229–1291) the capital and the only important relic of the Latin kingdom of Jerusalem. The legend in the north, "Far towards Boreas dwells the old man of the mountain," is another contemporary touch. For the "Assassins," perhaps so named from their Hashish-smoking, still survived in Matthew's time, and were not finally destroyed till 1256, when the Mongols exterminated them.†

* Trapani.

† The sect was of Shiah tenets, supported the Fatimite Khalifs, and made war impartially on Christians and Abbasside Mohammedans. Their founder, Hasan Ibn Saba, *c.* 1090 took up his residence in the Lebanon, and hence was named "Shaikh El Jebel," chief, or elder ("old man"), of the mountain. It is quite possible that Matthew, who died in 1259, had not heard of the ruin of the Assassins in 1256.

The picture of the camel and its driver, representing the Levantine trade of the thirteenth century, recalls somewhat similar things in the maps of Ebstorf and Hereford.

Like Matthew's World-map, this sectional 'Palestine' (in sharp contrast to his 'England') has the traditional outlines of the ordinary mediæval map. On the other hand, its text (as in the other works of this author) is for the most part new, and stands in close relation to the itineraries of the period of the Latin Kingdom in Syria. Three of these are plausibly suggested by Konrad Miller as sources of Matthew's Levantine knowledge: "Les Pèlerinages pour aller en Jérusalem," "Les chemins et les pèlerinages de la Terre Sainte," and "La dévice des chemins de Babiloine" (*i.e.* Babylon of Egypt). The first of these is of 1231, the second of 1265, the third of 1289–1291; but it is probable that earlier redactions of the two latter already existed in Matthew's time, and were used by him before 1259. Thus 'La Dévice,' which is of course a description of Egypt, mentions the arm of the river "which the people of the King of France passed over," and herein appears to refer to the crusade of 1251, led by Louis IX.

II. (*a*) Some have thought that Matthew Paris, in the northern part of his map of Palestine, makes use of an older map; but this does not appear, as has been rashly stated, from a comparison of Matthew's sketch with the famous Plan of Jerusalem, or 'Situs Hierusalem' of the earlier crusading period. This plan has come down to us, in various copies, from the opening years of the twelfth century; and one * of these copies seems to have been sketched by the anonymous compiler of the 'Gesta Francorum.' Professedly, but not literally, the 'Gesta' follows the narrative of Fulcher of Chartres, who described the first crusade as an eye-witness. The text of the 'Gesta' was probably finished before 1109; it is sometimes in close agreement with Fulcher, and at other times with the 'Situs Hierusalem;' but where the 'Gesta' and the 'Situs' agree, their content is distinctly different from Fulcher. Here, also, the 'Situs' is clearly the original and the 'Gesta' the derivative; for the material of the sketch, in relation to the Holy City itself, is far more ample, and some of its most curious inscriptions are not referred to in the 'Deeds of the Franks who took Jerusalem.'

(*b*) Along with the 'Situs Hierusalem' has been usually taken the famous tract, 'Qualiter sita est Civitas Hierusalem,' which has been supposed to be a paraphrase of the material contained in the Plan of Jerusalem just described. It is probable, however, that Tobler and Molinier are right in referring this pamphlet to the period before the first Crusade, and in suggesting the date of about A.D. 975, the era of the brief reconquest of the Holy City by the Byzantines under John Tzimiskes. In any case, the tract is properly independent of the 'Gesta Francorum,'

* That of St. Omer.

but is in some respects related to the original 'Situs.' Assuming the earlier authorship of the pamphlet, the draughtsman of the Plan of Jerusalem must have made use of the written description of Tzimiskes' time; while the author of the 'Gesta,' ignorant of the tract, is yet indebted to the same through the medium of the sketch,* which he uses and transcribes.

Eight copies of the 'Situs' are known, of which three are well known, those, namely, at St. Omer, at Brussels, and at Copenhagen. The first of these is of the twelfth century, and belongs to a manuscript containing the anonymous 'Gesta Francorum' already noticed. The second or Brussels copy is bound up with the crusading records of Fulcher of Chartres. This example, like the former, depicts at the top of the sheet the whole course of the Jordan, with a number of other place-names taken from, or at least agreeing with, the ordinary mediæval descriptions of Jerusalem, but sometimes in unusual positions. The reason of these apparent errors lies perhaps in the fact that the 'Situs' is but a section of a more extensive original, and that into this section have been crowded place-names and sketches from other portions of the larger map. Thus, besides the upper Jordan and certain places of Galilee, we have—placed in the immediate neighbourhood of Jerusalem—various indications of the Way of the Israelites from Egypt through the desert.

The Copenhagen copy, from an Icelandic manuscript of the thirteenth century, has lost all these traces of a wider outlook. Even the surroundings of Jerusalem are here wanting; and various additions have been made, which are clearly of later date than the first crusade. Lastly, the Temple and Sepulchre of the Lord have lost the round form which appears in the earlier copies of the 'Situs,' and which refers us to the buildings of the pre-crusading period. Among other copies of this plan, the twelfth-century Stuttgart is probably a copy of the Brussels manuscript; the Cambrai example, of about the same date, is square in form, like the Montpelier of the fourteenth century, and offers various peculiarities; the London design, of about 1200, and Count Riant's thirteenth-century copy, conclude the list. The last-named is perhaps from a Florentine manuscript of earlier date than any now surviving. The city of 'Masphat,' which here is both pictured and named, appears without inscription on our other copies, which are all executed with less care and elaboration than this one. Some of its legends outside Jerusalem are apparently additions of the copyist, and recall the twelfth-century pilgrim, John of Würzburg.

III. Another plan† of the Holy City and its environs, of far earlier

* The 'Situs.'

† The best study of this is by Germer-Durand, 'La carte mosaique de Madaba' (Paris, 1897). See also K. Miller, 'Rekonstruierte Karten, Anhang,' pp. 148–154; and Lagrange, 'Révue Biblique' (1897), vi. B., pp. 165–184.

date, has recently been discovered; and though no clear connection can be traced between the details of this plan and those of the 'Situs,' of Matthew Paris, or of the tract 'On the Situation of Jerusalem,' yet it would not be right to leave out all reference in this place to the mosaic map of Madaba. The work in question is one from the best age of Byzantine art, the period of Justinian, and it may therefore claim to be the oldest existing specimen of a Christian map; for its date of about A.D. 560 clearly precedes by a good two hundred years that of the Albi map (A.D. 750); and though the original designs of Kosmas Indicopleustes must have been executed twenty or thirty years earlier than this mosaic, the oldest manuscript we possess of the 'Christian Topography' does not carry us back further than the ninth century. Moreover, Kosmas' map-sketches are mostly limited to the Florentine manuscript of the tenth century. Compared with the latter, the Madaba mosaic is of much greater merit, as far as we can judge from its broken and damaged state; it is not unworthy of the reign of the Restorer of the Empire; and it increases our regret for the loss of so much Byzantine work in this as in other fields. However, the Madaba map is only concerned with Palestine and parts of Egypt and Arabia; its special subject is the Holy City itself; and here it probably reproduces the exact state of Jerusalem about 560, half a century before the Persian capture and sack of 614. Madaba, the Biblical 'Medeba,' the 'Medaba' of various writers of the later imperial time, lies east of the Dead sea, a little south of Heshbon, south-east of Nebo, or Pisgah, and on the Roman road which ran from Damascus to Petra and the Red sea. It was also close to another Roman road, which, coming from Jericho and running eastwards to the edge of the desert, crossed the former, or Damascus-Petra, road at Heshbon. Once it belonged to the tribe of Reuben; it is mentioned by Josephus, Ptolemy, and Stephanus of Byzantium; and from the fourth century till the Moslem invasion it was the seat of a Christian bishop. No further interest attaches to it till, in 1880, the Syrian Christians of Kerak were obliged to leave their old home, and so migrated to Madaba. They cleared away the rubbish from the place where they began their new buildings, and discovered under the soil hewn stones, pieces of mosaic flooring, and fragments of pillars. In December, 1896, a fragmentary map-picture was found in this mosaic. The extension of the design is somewhat similar to the smaller Jerome map, where Neapolis, or Nablûs, lies in the middle, and where the Mediterranean forms the western limit. In its pictorial character, and especially in its town-vignettes, the Madaba plan also recalls one of the Beatus copies (that known as Paris III.), which gives us a number of cities showing no resemblance to the representations of a flat design, but much to those of a plan in mosaic. In the Madaba city-pictures we may also see an obvious likeness to the towns of the great Roman road-maps, such as the Peutinger Table.

The mountains of Palestine are here marked by variegated lines. The Dead sea is remarkable for its exaggerated size, its blue wave-lines, and the two large ships that float on its waters. In the Jordan and the Nile are several fish. A piece of the Arabian gulf is indicated in the extreme south. In the desert fringing Palestine and Egypt the oases are marked by palms, around which lions (?) are chasing gazelles. Among other features, the Serbonian Bog is marked between Palestine and Egypt. Near the meeting-place of Philip and the Ethiopian is the oak of Mamre; the springs of Kalirrhoe are also marked; and a ship lies in the lower Jordan, with an enormous cross-piece to its mast, looking like a bridge over the river. The delta of the Nile is well shown. But the city-pictures are by far the most important features on this map; some of them seem rather fantastic, but in general they appear to correspond pretty well to fact. That of Jerusalem, in particular, seems to preserve a true outline of the chief buildings of the Holy City, as they stood before the destruction of A.D. 614. In any case this is one of the oldest pictures yet discovered of Jerusalem outside the Assyrian and Egyptian monuments.

The Madaba map has only been recovered in fragments; hence we can only conjecture, though with great probability, that its object was primarily to show the division of the Twelve Tribes of Israel. It was, of course, designed for the pavement of a church, and is strictly ecclesiastical in type. Its notice of the monastery of St. Sapsas,* on the east bank of Jordan, refers to a foundation of the early sixth century; most of the other names (in all 130) correspond with places mentioned in Eusebius's 'Onomasticon,' but some of them are not otherwise known, and occasionally older and newer forms are given together.

METHODS OF SURVEY EMPLOYED BY THE CHILEAN BOUNDARY COMMISSIONS IN THE CORDILLERA OF THE ANDES.†

By Prof. A. BERTRAND (University of Santiago, Chile).

THE purpose of the present article is merely to draw the attention of those who are interested in the processes by which the geographical knowledge of the Earth is obtained, to some practical means employed by us, that a large experience has proved to be very successful—more successful, indeed, than we hoped for when we first began to apply them. I do not claim for any of our processes the merit of invention or even of novelty, but only that of having been employed to a very large extent, and with very rapid and fairly precise results, where the usual processes would have occasioned a longer delay and produced only geographical sketches, with the resources at our disposal.

* Or Sapsaphas, a contemporary of Elias, Patriarch of Jerusalem, A.D. 494–518.

† Read at the Royal Geographical Society, Afternoon Meeting, March 27, 1900.

The main and distinctive features involved in our processes of survey of the Cordillera of the Andes to which I allude are—

1. The substitution of a polygonal network along the Cordillera valleys for the usual triangular network over the summits.

2. The peculiar long-range telemetrical measurement of each side of the polygonal perimeter.

3. The fixing of the true bearing of the sides by the exclusive observations of the maxima digressions of circumpolar stars.

4. The checking of the positions of crossing-points by their latitudes, obtained exclusively by observations of differences of zenithal distances with small and transportable instruments.

5. The checking of the positions of important points of the different polygons, in longitude, by means of the electric telegraph, and occasionally of secondary points by star occultations.

6. The suitable preparation on printed forms and drawn maps or diagrams of all the elements needed for observing, calculating, or drawing of the results of the survey.

Before going into details, I should, perhaps, say something about the extent and purposes of the survey I am speaking of. This survey has been entered into on our side as an accessory to the marking out on the ground of the boundary-line agreed to by treaty between my country, Chile, and the Argentine Republic, not confining, however, our survey to the ground close to the boundary-line; on the contrary, we have taken an especial care to start operations at geographically determined points of the central part of our country, and when it has been necessary or convenient, of the Pacific coast, so as to maintain a geographical connection between the different parts constituting the survey.

As to its extent, our survey will embrace when completed, along the Cordillera of the Andes, nearly 2000 miles from north to south, between the 23rd and 52nd parallels of south latitude, on a nearly meridional line confined between the 67th and 74th meridians west of Greenwich.

Topographical Work.

No ground could be, apparently, better adapted to the usual method of trigonometrical surveying than the Cordillera of the Andes, as the numerous summits of its various chains or ranges, once reached, could leave nothing to be desired as trigonometrical stations. It becomes, then, necessary to explain why preference has been given by us to a polygonal network over a trigonometrical network in this case.

The explanation is simple enough, and lies in the comparison between the two following statements :—

Triangulation is a special work, carried on by the summits of the hills, and requiring an ascent to each station, an ascent that is the more difficult in proportion to the bad condition, scarcity, or absolute non-existence of roads or paths to reach the tops. Besides, the location of stations on hilltops leave them exposed to the fierce winds that on the Andes blow every day, especially in the afternoon, with such a terrific force as to often absolutely prevent the carrying out of any surveying operation.

Polygonation, or geodetic traverse-work, as it should be called here, is, on the other hand, an operation that may be easily carried on by the bottom of valleys, at the side of the roads or paths already existent, and without interfering with, or delaying too much, the purposes of the journey that is being made by a party, whatever else might be its object.

This was precisely the case with the Chilean Boundary Commissions. They were ordered to mark out as a boundary-line the water-parting line of the Andes, which, like all water-parting lines, may be easily found in almost all cases by mere ocular inspection, without requiring any preliminary survey of the ground. As the commissions were instructed, however, to carry on such a survey as a subsidiary operation without unduly delaying the demarcation of the boundary, and with the chief purpose of showing on a map the real configuration of the ground along and at both sides of the boundary-line, it was deemed advisable to select a method the results of which might be relied upon, not only for the purpose alluded to, but also for the more generally useful one of providing a map composed of parts geodetically connected with one another, and with the settled and already surveyed part of Chile. The method of polygonation, besides being the more expeditious, offered the additional advantage of supplying at once a horizontal map and a vertical section of every Cordilleran valley where the route of the expedition would pass, laying in this wise an efficient basis for the future opening and construction of roads on that difficult ground.

To make thoroughly understood the practical importance of all the circumstances that have been mentioned, we might perhaps insist a little more on the material difficulties attending the execution of a proper geodetic triangulation in the Andes. In the first place, it must be borne in mind that each commission, composed of three or four surveyors and perhaps ten to twenty attendants, has to be equipped once for each season—that is, four to six months, during which they have no communication whatever, but by special messenger, with the civilized world. Each commission then starts at the beginning of the season, with the proper number of horses and mules for pack and saddle, and those animals, which frequently get but poor pastures, have to last through all the season without possibility of being relieved or exchanged. Now, in order to carry up the surveyors, their attendants, and instruments to the top, or even near the top, of the high hills that must be selected as geodetic stations would require a supply of beasts of burden hardly compatible with the desirable mobility of the camp. Either these hills are bare and their slopes covered with disintegrated rock on which the hoofs of the animals have little hold, or they are clothed, up to a certain height, with forests or brushwood through which there is absolutely no path. Those difficulties are not, of course, impossibilities, but the work and the expense of surmounting them would have been absolutely out of proportion with the actual usefulness of the result that might have been obtained.

On the other side, the polygonal method permitted, as has already been stated, the carrying on of the operations of the survey along the route of each expedition, and did not require of the pack and animals much greater work than would be necessary for the mere marking out of the boundary.

At the same time, it was not overlooked that the results of barely applying the usual topographical traverse survey method would have been very deficient, and it devolved on me to devise such modifications and adaptations of other methods as could give to our results a geodetic value.

I will now proceed to show, as briefly as possible, how this has been attained.

Measurement of the Sides.

As it is well known, the usual methods for the measurement of the sides in topographical traverse work are: (1) the direct measurement by chains or steel tapes, from 60 to 150 feet long; (2) the indirect method, by the transit and stadia, otherwise called tacheometry. In the first case there is no other limit to the length of the sides than the material possibilities of a measure in straight line; in the

second case, however, the length of the sides cannot be measured with anything like accuracy, beyond 1500 feet.

In fact, by any of those methods, and taking into account the very tortuous shape of our Andine valleys, the sides would have been very short, and consequently a very great number of turning-points required for reaching the summit of the Andes from the centre of Chile. Now this multiplicity of stations entails, on one hand, the probability of accumulation in angular errors, and, on the other, a danger of increase in each individual error, on account of the defective centration of instruments and signals being the more sensible for short distances.

Moreover, the direct measure would have been, in many cases, impossible where the paths run alongside of tortuous cliffs, or amidst tangled bushes, or similar obstacles.

The method that we have actually employed is based on the same geometrical principle as ordinary tacheometry. This well-known principle rests on the resolution of a very acute triangle, the summit of which is at the observer, its small side being commonly measured on a wooden staff, from 12 to 15 feet along. For long ranges, say 1500 feet, fixed-length staffs are used, and the small (diastimetrical) angle at the summit is measured micrometrically, usually by a micrometer attached to the instrument.

Now, we have replaced the wooden vertical staff by a nearly horizontal steel tape or wire, 100 metres long, the extremities of which are made visible by signal flags, and we measure the diastimetrical angle at the summit, on the horizontal limb of an ordinary 5 or 6 inch transit theodolite. The range of length of the sides is thus increased indefinitely, as, when the ground is suitable, the base may be extended to 200 or 300 metres, or, better still, a small triangulation may be carried out at one end of the side, and any two suitable points nearly at right angles with the side may be selected to form a base. In this wise sides of 10 to 15 miles have been measured with very little trouble and good accuracy.

It is plain that, to obtain exact results by this method, only two things are necessary—a very exact measurement of the base, and a very exact measurement of the diastimetrical angle.

Setting aside, for the present, the less important elements of the question, I will now proceed to explain how those two kinds of measurements have been effected in our case.

The 100-Metre Apparatus.

This is simply a steel wire, about 102 metres long, weighing under two pounds, near both ends of which are soldered two small slotted brass plates; the distance between the slots being exactly 100 metres, when the wire is freely suspended by both extremities, without any intermediary resting-point, and under a given pulling strain (about thirty pounds), at a temperature of 60° Fahr. The wire is held in place by two assistants by means of suitable handles, and, when not in use, is rolled on a wooden reel.

The wires we are using have been prepared by the surveyors themselves, at our Boundary Office, where standards have been laid down, by means of a 100-metre steel tape previously controlled at the Geodetic Survey Office at Washington. The proper tension is obtained by means of an ordinary spring balance.

Under these conditions the light 100-metre wire allows the two signal flags to be set at that exact distance, no matter how broken the ground may be, even with a brook or torrent rushing between. Then, it presents very little surface to the wind, and it must be observed that the accuracy of the measure is in no way affected on this score, provided the proper tension is kept, as it does not matter in the least

whether that tension is produced by gravity alone, or a part of it is due to the wind.

The 100-metre base gives a diastimetrical angle of more than 2° up to 2500 metres, and may be safely used up to 5000 metres. For longer sides, if the ground allows it, bases two wires long may be measured, or a longer one calculated as a side, a diastimetrical angle being measured at one end, and the 100-metre wire stretched at the other. Both methods have been employed with good results.

The Diastimetrical Angle.

I have already stated that our diastimetrical angles are measured on the horizontal limb of a theodolite, rather than by any micrometrical device. Preference has not been given to the former method without trial, and though it would perhaps be tiresome to explain at full length the reasons that have determined such a preference, the chief may be summed up as follows:—

By measuring the small angle on different parts, symmetrically distributed, the angular measure may be brought down to any required degree of accuracy, eliminating, within the required limits, all the instrumental and observation errors. That result cannot be secured with a micrometer, especially as regards the errors arising from observation of images produced outside of the optical axis of a telescope, as is always the case with micrometrical measures.

Besides, a micrometer is a very delicate and undesirable adjunct to a field theodolite, and is liable to get out of order, as a consequence of the rough handling to which those instruments are sometimes unavoidably subjected. To anybody wishing to ascertain by himself the capacities of the micrometer and the horizontal circle, on a given theodolite, I should suggest a practical test with a known angle, by both devices.*

To bring down the measure of each side to a given standard of accuracy, it would be necessary to determine previously the number of repetitions of the angle that would be required, in view of the value of the angle, and of the length, yet unknown, of the side. This, of course, could be roughly estimated, or obtained by a preliminary calculation. But, for all practical purposes, we have deemed it sufficient to increase the number of repetitions in inverse ratio to the size of the angle, from two repetitions for 5° up to six repetitions for $\frac{1}{2}$°.

Calculation of the Sides.

The accurate measures of the base-line and of the diastimetrical angle are, as already stated, the chief elements of this calculation. Less important measures are also made, with a lesser degree of accuracy, of the angles formed by the base-line with the polygonal side, and with the horizontal line, as well as readings of the barometer and thermometer. The latter are used only to effect corrections on the calculated base length, to reduce it to the standard temperature of 60°, and to sea-level. These corrections are previously tabulated.

The calculation itself involves only the sum of four logarithms, and is carried on on printed forms.

Perhaps I might point out that a check on the length of each side could easily be obtained, taking successively each of its extremities as a summit for a diastimetrical angle; but in practice, with closed polygons, this has not been found necessary.

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* The superiority of the horizontal circle over the micrometer for measuring small angles has been maintained, I find, by Colonel Tanner, in an article entitled "Bar Subtense Surveys," in *Proc. R.G.S.*, 1891, p. 675.

Polygonal Angles.

The angles between two consecutive sides are measured by means of a common transit, to which is attached a long needle compass. At every station the line 0°–180° of the horizontal limb is made to coincide with the magnetic meridian, and independent readings are then made in the direction of each side, the value of the polygonal angles being found by differences. The operation is repeated; the line 90°–270° being this time in coincidence with the magnetic meridian. In every case readings are made in the direct and reverse positions of the telescope.

The object in referring all bearings to the north line of the compass is twofold: the first is to have from the beginning a set of magnetic bearings that may be utilized at once to draw a sketch of the route; the second and more important is to supply, by differences with the true bearings of the sides, when they are ascertained afterwards, very reliable and valuable data respecting the magnetic variation of the needle at all places where the survey has reached; the whole of these data will, at the completion of the work, permit the drawing of a magnetic map of the Andes, such a map being a source of information much needed among mining prospectors and such kind of explorers.

Polygonal Network.

Each main polygonal line is usually made to cross the water-divide of the Andes by one of its lowest points or passes, and is extended to either side in most cases by the bottom of transversal Cordilleran valleys and between mountain ranges till meridional valleys are found, where secondary polygonal lines may branch off, so as to obtain a connection with the next main polygonal lines to the north and to the south. Thus a network of closed polygons is formed, where any error of measure or calculation is easily detected, on the graphic construction of each closed perimeter, which is treated as a unit; the small errors of closure being distributed among all its sides. Such errors have not been, on an average, superior to 1 in 800.

When all the polygonal units of a season's work are put together, due consideration is given to the latitudes astronomically determined at the principal points, and a final adjustment is made of the whole, implying usually very small corrections, but effectively preventing the accumulation of errors and their propagation from one section of the work to the others.

Trigonometrical Levelling.

This has been carried out simultaneously with the surveying operations on the usual lines—that is to say, by reciprocal zenithal distances for the station points, and by single zenithal distances for the outside hilltops. Suitable tables for correcting the refraction have been provided in the latter case, allowing a new index of refraction to be introduced, if necessary, at very great altitudes. Beyond this I have nothing of particular interest to mention in connection with this part of our work.

Astronomical Operations.

I have already stated the purposes for which astronomical observations have been undertaken in connection with our survey. I must now point out the peculiar conditions under which our observers have to labour, arising as well out of the astronomical peculiarities of the southern hemisphere, and the meteorological peculiarities of the Andes, as from the practical impossibility of devoting more than a few hours every night to the observations.

The absence of stars above the fifth magnitude in the neighbourhood of the south

pole, and the consequent impossibility of recurring to any of the methods of observation on the Pole-star so popular in the northern hemisphere, have led to our selecting other methods, already well known to professional people, but to the practice of which we think we have contributed some sensible improvements in connection with the use of portable instruments.

The almost constant and often violent winds that blow on the heights of the Andes and on the high bare plains of Patagonia, interfere very seriously with the setting of the portable instruments, and even more with the usual method of lighting the ocular field of the telescope by means of a small oil-lamp. This difficulty is increased when it becomes necessary to observe the smallest stars visible with the telescope, as a very faint and steady light is then required.

Finally, the fact of the observers having to move and work almost without any rest during the daytime, makes it imperative that their necessary repose at night should not be interfered with; or, to put it in other terms, that the observations must be made in the short interval between dusk and bedtime.

On these somewhat restricted lines we had to adjust our selection of methods and instruments. As I have said before, I do not claim for either of them the merit of novelty; still, although these methods are at present largely practised, I am not aware that their practical possibilities have been tried in the methodical way adopted by us, or that their full capacity in point of facility of observation, elimination of errors, and simplicity of calculation, has been fully realized before.

The Instruments.

With the exception of a special instrument, that will be described further on, we have used almost exclusively Troughton and Simms's transit theodolites, the 5-inch transit for traverse work only, and the 6-inch, with the addition of a sensitive level attached to the vernier-plate of the vertical circle, for both astronomical observations and geodetic traverse. The latter has also been supplied with an electric-light attachment, consisting of a dry-cell battery and two minute bulb-lamps, one for the inside of the telescope and the other for the readings.

I ought to observe, by the way, that a perfect dry cell has yet to be invented, as far as I know. We have always found it necessary to carry with us the common oil-lamp attachment in anticipation of the electric plant refusing to work properly. Still, defective and liable to fail unexpectedly as they are, they have been most valuable adjuncts, and a good deal of astronomical work, especially with the fourth and fifth magnitude stars, have been carried out amidst strong winds, that would not have allowed a steady light with the oil-lamp.

Elements of Observation.

For the reasons already explained, as well as with a view to the requirements of the methods employed, it was deemed of the utmost importance that the observations could be made on any star, visible with the faintest illumination of the wires, and in good position for observing during some two or three hours after dusk. As the English and French ephemerides do not supply the number of required stars, our first step was to have prepared and printed a field catalogue of southern stars, down to the fifth magnitude, these being usually observable on moonless nights, in the clear atmosphere of our cordilleras, with the 8-inch telescopes of our theodolites.

For this purpose I selected, out of the very valuable 'Stone Catalogue of Southern Stars,' prepared at the Cape observatory, all the stars of and over the fifth magnitude between the South pole and the twelfth degree of northern declination; the number of stars thus obtained amounted to 818, more than two-thirds

of which were not contained (in 1897) in any current ephemeris, so that transit observations could be taken, on an average, every two minutes.

Without dwelling on the arrangement of the catalogue, I will only make the remark that I thought it advisable, when it was printed three years ago, to bring down the mean places of stars to the epoch of the present year, 1900, as our work was rightly presumed to extend as much after as before that time. Moreover, this implied also some simplification of the computations, as the epoch of the Stone Catalogue is 1880, and all corrections could then be applied for a twenty-years' interval. I may also mention that, to avoid useless calculations, the names of stars included either in the English or French ephemerides have been printed in bold type, so that, when observed, their position for the day might be directly taken from these publications.

The use of our Field Catalogue is further facilitated by that of a star map, specially drawn, and showing the 818 stars contained in the catalogue.

Methods of Observation.

In the selection of our methods of observation, we have been guided by a general principle that we think ought never to be disregarded when reliable results are required, either astronomical or belonging to any other branch of experimental science. This principle may be stated in, so to say, an axiomatic form, viz. that, in order that the results obtained by a given method of observation may be called reliable, that is, in a certain measure free from errors, such method must provide for the systematic elimination of all the errors that may be involved, either in the elements of observation given as data of the question, or in the instruments employed, or in the peculiar conditions under which the observer may be labouring.

For instance, to quote a well-known case, suppose the latitude of a place to be determined by a given number of culminations of stars. However great the number of culminations observed may be, and however careful the setting of the instrument, if all the observations have been made on stars culminating on the same side of the zenith, and in the same position of the instrument, the final result will not be free of certain systematical errors. Any fault of horizontality in the initial position of the axis of collimation will affect equally all the results; any systematical error in the declinations given for the observed stars will also be transmitted to the results in their integrity; finally, all errors due to the actual index of refraction not being (at the place of observation) exactly the same as that assumed for the computation of the tables, will also affect the result without any possibility of attenuation.

Now, on the other hand, suppose that half of the culminations observed take place to the north, and the other half to the south of the zenith; then all systematic errors in star declinations, all errors due to vertical collimation, will affect with contrary signs each half of the results, and will, consequently, be more or less eliminated. If, in addition, the telescope is reversed for every other observation taken on each side of the zenith, more instrumental errors will be eliminated. Finally, if the stars are grouped in pairs in such a way that the two stars of every pair culminate on different sides of the zenith and at nearly the same distance from it, then all errors due to refraction will also be eliminated.

Once the systematic errors as nearly as possible eliminated by the application of the principle just illustrated, the importance and probable value of accidental errors may be ascertained by the usual method of the least squares, and the true scientific value of each result may then be known, and accordingly made use of.

Together with the foregoing scientific principle another of a merely practical

kind might be quoted as one that previous experience had enabled us to test thoroughly. It is to the effect that when a large number of observations, involving necessarily a much larger number of calculations, are to be made, the utmost care and ingenuity must be displayed in preparing, down to its minor details, the methodical arrangement of the several operations involved. All the time and all the labour thus employed in the laying down of the work as a whole will be amply repaid by the saving of it in each individual operation. I proceed now to give some particulars as to the methods employed by us for each kind of observation.

Latitude.—The outline of the method by small differences of zenithal distances of stars at their culmination on both sides of the zenith, has already been given in the example we have quoted; this method is also recommended in the 'Hints to Travellers,' where it is briefly described. The idea of employing exclusively this method with a common transit for the accurate and systematic determination of latitudes occurred to me when studying the results obtained by Talcott's method with the zenith telescope. I thought then that the main advantages of the method could be secured in a reasonable measure, without the need of a special and cumbrous instrument, provided a much larger number of stars than those supplied by the Ephemeris could be observed, and all the preparatory work that could be done before was previously executed at the office, and as little as possible left to the observer. The subsequent experience has proved that I was right. The practice of the operations in our case is as follows:—

Supposing the latitude of the place to be known within a few minutes, as well as the local time within a few seconds, results that may be obtained by a noon or other simple observation, the first thing is to draw up a list of the catalogue stars culminating after dark, say during three hours, and arrange them in pairs, culminating one north, one south of the zenith at equal distances, within one or two degrees, and within an interval of time not exceeding, say, fifteen minutes. This preparatory list is easily made with the aid of the star map, where the trajectory of the zenith may be drawn, and the pairs of stars selected by sight or with a scale of minutes. It is always possible to have more than two pairs of stars, and frequently as many as eight or ten in two or three hours.

Printed forms are then filled with the necessary data for the observations during the stay at the station, viz. the names of the stars, the time of culmination, the approximate settings of the vertical circle in its two positions; these data being calculated in view of those of the catalogue and the approximate latitude. This first form may be prepared some days before that on which the observations are to begin, provided the rate of the chronometer or watch is known. A good common watch, such as are used by enginemen, is well suited for the purpose.

Just before making the observations, if the night is clear, the pairs to be observed on that particular night, as well as the setting of the vertical circle in the position (right or left) in which it is to be read for each pair, may be inscribed on the observation form, together with the watch times for each observation. If the weather is cloudy, it is better to wait till a few minutes before each culmination, so as to see if there is any chance of taking the observation, before making the entries.

The instrument ought to be set in the day time, when a stake is also set, some hundreds of feet off, in the direction of the meridian, approximately obtained by the compass and the knowledge of its variation. The stake is very convenient for ascertaining again the direction of the meridian, and resetting the theodolite in case of its having been disturbed by accident.

With respect to the setting of the vertical circle, we should observe that, when

possible, the difference of zenith distance between the two stars of each pair ought not to exceed the run of the tangent screw, in which case the vertical circle may be set midway between the two readings, and these may then be observed without loosening the clamp screw.

All being ready, each star is looked for, a little to the east of the meridian, some minutes before its culmination, and, when found, is kept on the horizontal wire by means of the tangent screw until the culmination. The observer must keep his eye on the sensitive level, and make a record of the readings as near as possible at the moment of culmination; the readings of both verniers are also recorded. Finally, readings of the thermometer and barometer for corrections of refraction are also made once for each night.

The importance of the latitude being known beforehand with fair accuracy is apparent; otherwise, when small stars are observed, a wrong one might easily be sighted. It is also convenient as a means of avoiding too much difference between the prepared settings and the registered readings.

In working out the results of the observations, an additional check is obtained on the accuracy of the result, as one value for latitude is deduced from each culmination, the average being taken, and another value is calculated by the formula for difference of zenith distances, where differential refraction is introduced. The whole computation does not require above ten minutes for each pair of stars.

Though this kind of latitude observation is not necessarily confined to the theodolite, and may be practised with the sextant, the results are not so good, unless for a specially trained observer, as it is rather difficult to identify small stars with this instrument; indeed, it is then almost impossible to observe any but the brightest stars.

On the other hand, when a very large amount of latitude work is to be undertaken, better accuracy than with a 6-inch theodolite may be obtained, if the expense of a special instrument is admissible, by means of a small portable instrument that I have devised and called "zenith sector."

The essential parts of this instrument are: (1) a fixed brass quadrant divided into whole degrees; at any point of this may be set the second part; (2) a movable 5° sector, 8-inch radius, with vernier attachment reading to 5″; (3) a fixed focus telescope with a long diagonal eye-piece, lighted internally by a small electric bulb; (4) a sensitive level with 5″ divisions, set on a first horizontal plate which rests, by means of three fine-thread screws on the next part; (5) a base plate, with common levelling-screws and an horizontal limb divided in whole degrees; and, finally (6) a solid steel-braced stand, low enough for the observer to be in a sitting position.

There are at present three of these instruments in use with our boundary commissions; they are of little weight, easy to set in position, and allow more comfort for the observer than the theodolite. The accuracy of the first of these zenith-sectors, constructed in 1895 by Troughton & Simms, was tested at the Santiago Observatory, with the following results:—

Date.	Pairs.	Probable error.	Actual error.
November 14, 1895	5	1·9″	1·5″
„ 21 „	3	0·4″	1·4″
„ 30 „	8	0·9″	0·8″
December 1 „	9	1·2″	1·7″
„ 3 „	5	1·8″	0·3″
Averages	6	1·2″	1·1″

These results show that, by the observations of six to eight pairs of stars with the zenith sector in a single night and in good conditions, an accuracy within 1″ may be obtained. In field practice, as it might be expected, the range is a little wider, as single errors of so much as 10″ are incurred, when a very strong wind is blowing, or other unfavourable circumstances occur. Still, the 1″ accuracy is usually attained by ten to twelve pairs.

With the 6-inch theodolite, about half as much accuracy as with the zenith-sector is attained.

Before finally leaving the subject of the latitude, we ought perhaps to make some remarks about two causes of error that cannot be eliminated or compensated. In fact, rather than errors, they should be called effective discrepancies between the astronomical and geodetical latitude of a given place. The causes to which we allude are the attraction of mountain masses and the variability of the polar axis of the Earth. Owing to the first cause, the plumb-line is deviated from the vertical direction, and consequently the apparent zenith is shifted to one side of the true zenith; as a further consequence, all arc measurements made on vertical limbs of instruments are thereby affected. The range of errors or differences arising from this cause in a mountainous country is much larger than the range of accuracy attained in our determination of latitudes, as it amounts sometimes to 10″ and more. It has happened that the difference between the astronomically determined latitudes of two places, only separated by a high range of mountains, has exceeded the true difference obtained by direct measurement by as much as 25″.

As to the error in latitude caused by the shifting of the terrestrial axis, it never exceeds $\frac{1}{2}$″; it may only be mentioned as accounting for small differences in latitude determinations of the same place, made at different times of the year.

Azimuth.—The same principles that have led to the observing of stars at their culminations on both sides of the zenith for determining latitude, have also held good for the observation of stars at their elongations (or maximum digressions) on both sides of the meridian for azimuth.

This refers not only to the elimination of errors, and to the preparation of the elements of observation, but also to the fact that in both cases the observations are not instantaneous, and that the time element, so difficult to be relied upon in field practice, only comes in as a finder, and is not introduced in the calculations.

There is, however, a strong dissimilarity between the two cases, respecting the possibilities of observation, that should be pointed out before going on. Every star is bound to have a culmination, that is, a retrocession in the sense of altitude, and, if visible at that moment, is available for observation without more restrictions than to avoid low altitudes on account of refraction. On the other hand, every star does not necessarily pass by an elongation or retrocession in the sense of azimuth, since all stars that do not pass between the apparent pole and the zenith present a continuous movement in azimuth, and consequently are not available for this kind of observation. I must also make the remark that, although the elongation of "circumpolar" stars is usually spoken of, the stars selected in this case must be "circumpolar" only in the sense of lying at their upper culmination between the pole and the zenith, and not in the ordinary sense of lying above the horizon at their lower transit; it follows, then, that the possibilities of this method are greater for low than for high latitudes. In fact, as we go farther from the equator, the number of stars available for observation become less and less, at the same time the conditions for observing each individual star at elongation become less and less favourable on account of the higher altitude at which the phenomenon takes place, and the consequent greater liability to errors in azimuth.

Apart from this, the practice of the method is very similar to that which has

been described for latitude, only that the extreme readings are made on the horizontal circle, instead of on the vertical circle.

The filling in of the printed forms with prediction data is rather more complicated than in the case of latitude, this being due to the fact that the stars are observed outside of the meridian, and consequently settings in azimuth as well as in altitude are required. On the other hand, there is not the same necessity for the stars to be grouped in pairs, and even when this is done for the sake of symmetry, there is no restriction as to the difference of azimuth for the two stars of each pair, as there is no refraction to be eliminated.

The selection of the stars to be observed is better made, as in the case of the latitude, on the star-map, where the position of the meridian and 6-hour circle after sunset may be easily ascertained, and, considered in connection with the trajectory of the zenith, allow the convenient stars to be found, at small distances over the 6-hour circle, increasing with the latitude.

The elements to be determined in order to point the telescope at the right moment at the proper star are—the time, the azimuth, and the altitude. Each of these elements is easily found by a simple formula, but in case of a whole list it is more expedient to make use of graphic tables such as we have had prepared in our case. On these diagrams may be measured directly the hour angle, at the moment of elongation, the difference of altitude between the star at the same moment and the south pole, and the difference between the elongation azimuth of the star and its polar distance. The variations of the three elements are always relatively small, and may be easily figured on a scale large enough for ascertaining whole minutes of time and circle, and no more than this is wanted for prediction purposes.

As to the observation, it must be borne in mind that its ultimate purpose is always to find out the true direction of a given line on the ground. In consequence, the utmost care must always be displayed in marking out that line in the day time, the theodolite being well centered over a stake, and another stake being driven in at a distance long enough (over 300 feet) for the sidereal focus of the telescope not to be disturbed in sighting it at night-time.

In our case the true bearings have always been based on a minimum of four observations, two being made on eastern elongations in each position of the vertical circle, and two on western in the same conditions; this being done to eliminate systematic and instrumental errors as in the case of the latitude. Still, the same accuracy of results cannot be expected, as small errors in the setting of the vertical axis of the instrument will affect the azimuths much more than the altitudes; the more so the nearer the zenith the observation is made, so that individual errors of one minute or even more may occasionally occur. Still, the accuracy obtained by two pairs of elongations is more than enough for the purposes of our survey.

The calculations for obtaining the true bearings of the sides of our polygonal perimeter have been carried out on two series of printed forms—the first to obtain the bearing of the reference line between the instrument and the stake erected for that purpose; the second to obtain the true azimuth of the sides, as derived from the first and from the successive station angles. As many polygonal stations occur between two successive astronomical stations, a difference must be expected to be found between the azimuths of the first side of a section of the perimeter, as derived from astronomical observation and from the transported azimuths of the preceding sections. This difference is due to two separate causes—the convergence of meridians, and the actual errors of observation at the successive angles. The value of the convergence of meridians for each side is computed by the simple known formula, the required difference of longitude being sufficiently appreciated on a rough sketch

drawn with the magnetic bearings. The remaining difference is treated as a sum of accidental errors, and divided equally among the intermediate angles.

As the magnetic bearing of each side is recorded, and the true bearing is now worked out, the difference between the two is taken, and duly registered as one of the more important parts of our work, for the purposes already mentioned.

To give an idea of the accuracy that may be expected in this kind of work, I may state that in a polygonal network of about 160 sides, with an average of one astronomical azimuth for each 10 sides, the average error of azimuth between two successive astronomical stations, apart from the convergence of meridians, was 1′ 30″, the maximum individual error amounting to 3′ 20″.

Time.—Observations for finding the mean time at each astronomical station are usually made on the first day of stay. These observations are made by single or corresponding altitudes of the sun or stars, as the case may be, simply in view of finding the error and rate of timekeepers, and do not require more accuracy than is necessary for the prediction of culminations and elongations.

On this subject I will make only two remarks. The first refers to the time-pieces themselves. We have had some experience in the so-called pocket chronometers, English and Swiss make, and have arrived at the conviction that, for field service, they are of no more value than a good common watch, twenty times less expensive. It has happened that while the chronometers and watches have been together under observation at the Santiago Observatory, the rate of the former was usually more regular than that of the latter, but in travel and field practice, the results were usually reversed, so that large silver watches, such as the American Waltham lever, have been found more reliable for our purposes.

My second remark refers to the usual method of finding the true time and rate of watch, that is, by equal altitudes of the sun, commonly observed in our case with the sextant mounted on a stand, and mercurial horizon. As it is known, the middle position of the sun requires a correction, called "equation of equal altitudes," to be reduced to the meridian; this equation being composed of two terms, one of which varies with the sun's declination, and the other with this and the latitude, so that both change signs twice a year. As the value of the equation is always small, it is not easy to detect when an error of sign has been introduced by mistake. When this method is to be extensively employed, however, as in our case, it is easy to provide at the same time for a check as to the signs and value of both terms of the equation. This we have done by means of two diagrams on which the said signs and values may be read at once for every day of the year. It must be observed that to give rigorous results both diagrams should only be employed for one year, and the second only for a given latitude; still the errors due to the first cause do not amount to more than one or two tenths of a second, and a scale for measuring the second correction at different latitudes is easily appended to the second diagram. Hundredths of seconds are easily read on copies of those diagrams.

For longitude work, however, the mean time of the place must be known with the utmost accuracy at the time of observation, and the rate of watches must be eliminated as far as possible—that is, the observations for time and for longitude ought to be done as simultaneously as circumstances should allow. This is usually obtained by single observations of stars for time before and after the observation for longitude, so that the same watch may be used; and even equal altitudes of one star, culminating at the time of the observation for longitude, have been observed. There is, however, another method capable of employment with a transit that we have recently brought into use, and I think it is calculated to give as good results for time determination as those which have been described for latitude

and azimuth, because it is founded on the same principles. By this method, the time is deduced from observations made on a pair of stars of nearly the same declination, a little before and after the moment of their equal altitude at opposite sides of the meridian.

To thoroughly understand the practice and advantages of this method, a few explanations are, perhaps, convenient. Supposing there were two stars of exactly the same declination, and the precise moment of their equal altitude be registered according to a certain watch, it is quite clear that, as the sidereal time of the moment of equal altitude would be given by the average of the right ascensions of the supposed stars, the watch error might be found at once. Now, if it is true that pairs of stars of exactly the same declination are not available, we may have them with small differences of declination, and corrections may be introduced, similar to the equation of equal altitudes for the sun. In the same way, as observations cannot, of course, be made simultaneously with the same telescope on the two stars at the mathematical moment in which they both arrive at the same altitude, a little lower (or higher) altitude may be observed, in which case the eastern star reaches it some minutes before and the western star the same number of minutes after that mathematical moment (or the reverse). Proper corrections are, of course, introduced, by means of tables and the right time obtained with little calculation.

The method I have just outlined is described in some astronomical treatises, but I believe it is not so extensively employed as it ought because the elements for the corrections require to be specially tabulated for the latitudes at which the observations are to be made. It is only in cases involving a large number of observations that the time and labour expended in such preparations will be amply repaid by the saving, especially of time, in making the observations by this method.

For the special case of Chile, tables have been prepared including 145 fundamental stars above the 5th magnitude, grouped in 200 pairs, the difference in declination for the two stars of each pair not exceeding two degrees, while the average interval between the moments of equal altitude for two successive pairs is a little more than seven minutes.

The observation may be made with the sextant or an ordinary transit, but more accurately and easily with the zenith sector already described, especially if additional horizontal wires have been inserted so that the interval between the extreme wires is a whole number of seconds. With such an instrument the method practised is as follows:—

A number of pairs are selected out of the list so that they do not overlap each other. For instance, if the eastern star is to be observed three minutes before the moment of equal altitude and the western one three minutes after, then seven or eight minutes must elapse between the moments of equal altitude of any two consecutive pairs of the observation list.

The settings for the horizontal and vertical limbs as well as the watch times are now computed to whole minutes with the aid of the special tables, and put down on the prediction form. The zenith sector used by us was fitted with five horizontal wires, the interval between the extreme ones being 1000″ of arc. The instrument is carefully set in altitude for each pair and re-levelled for each star, care being taken not to disturb the tangent screw of the sector during the observation of each pair. The times of bisection of the stars by each wire are registered, and also readings of the sensitive level are made before and after each observation; the divisions of the level being equal to 5″ of arc, their corrective value in fractions of seconds of time for each pair is easily ascertained and made use of. The half-sums of corrected averages of all the observed bisections for each star constitute the final record. As all the stars of the list belong to the English or to the French

ephemerides, the exact right ascension and declinations are taken therefrom for the date of observation, and with the aid of the ephemeris and of the special tables short final calculations are worked out, from which the error of the watch for each observed pair of stars is obtained.

In a test of this method made at the Santiago observatory on November 28, 1897, five pairs of stars were observed in an hour of time; the extreme difference between the five results being one-quarter of a second, and the probable error less than one-tenth of a second.

Longitude.—Between the 23rd and the 41st parallels there are some twenty places, more or less near the foot of the Cordilleras, where longitude has been or will be determined by means of the electric telegraph; these places being the starting-points for the partial polygonal surveys.

Telegraphic longitude work is described in astronomical treatises, and I shall accordingly confine myself to some remarks suggested by our experience on this point.

The time available for the operation is usually between 9 and 11 at night, when all intermediate offices being previously notified, the line is left clear, and direct communication is established between the place of observation and the Astronomical Observatory at Santiago, where the time-signals are chronographically registered. A separate register is also kept, of course, at the place of observation, where a good watch is used as timekeeper. On this subject I may observe that, as the watches do not beat even parts of a second, it has been found convenient to have at hand an old marine chronometer, only to be used for the beat; this timepiece is transported unwound and with a stop inserted across the lever-wheel. In camp it is kept running some hours before the transmission begins, and is used for this operation only, so that the manipulator key may strike half-seconds as the Observatory signals, and only the watch times are registered, at the first and last stroke of each series of ten seconds. When no interruption occurs, the whole operation, including several exchanges of series, is satisfactorily completed in an hour.

As the time for the transmission of the signals is always known beforehand, the last-described method of time determinations is especially suited for longitude work, because the pairs of stars may always be selected so as to eliminate the effect of the watch rate. If the same observer is to do the astronomical as well as the telegraphic work, four pairs of stars may be observed, two before and two after, the transmission of signals; with two observers, five pairs may be observed while the transmissions are going on. In the latter case it may be considered that, for all practical purposes, the rate of the watch has no influence at all over the accuracy of the longitude obtained. Indeed, in those conditions, it may be said that all causes of error but the differences of personal equation between both operators have been eliminated. It must not be forgotten, however, that, like latitude, the local time on which longitude work is based, is liable to be affected by the local deviations of the plumb-line.

It would require, of course, an accurate triangulation between two points, to find out exactly the actual errors that had been incurred when finding the difference of longitude between the same by the exchange of telegraphic signals. Still, a check on the practical value of the combined survey, by polygonal traverse and astronomical positions, has been obtained this last season, when at the meeting-point of two branches of the perimeter, the origins of which are more than 700 kilometres apart, the error in longitude was found to be 19″ of arc, about 400 metres, a result quite satisfactory for the purposes of the survey, the larger scale of which is 1 : 100,000.

Nearly 12,000 miles of polygonal network have been measured in the Andine

valley, within the last six years, by the Chilean Boundary Commissions, in the manner just explained. We hope, in the course of the present year, to complete the connection between the last polygonal sections in the southern portions of the country that is to be covered by the survey; a sure base will thus be laid for all future partial surveys to fall in at any point of our polygonal perimeter; the geographical positions of all such points being intended to be then published for that purpose.

The following discussion took place:—

Sir JOHN FARQUHARSON: I am afraid I am not well qualified to make any remarks, because the whole of my experience has been with trigonometrical surveys. The paper is certainly a very interesting one, and I am sure, when it comes to be published in the Journal of the Society, it will be exceedingly useful to read up. What I generally had to do in the way of surveying was to measure from very carefully triangulated areas down to feet and inches, but when you come to a map of 1: 800,000 this is a different matter altogether. The only question I should like to ask, being as I am more accustomed to triangulation, is whether the whole of these surveys are done by this polygonal system, or whether they are connected with or start from any triangulated survey. If they are, I should like to know what the errors of closure are, where the surveys meet. I must say that Prof. Bertrand has given a most interesting paper, and the whole Society is much obliged to him for it.

Sir MARTIN CONWAY: I don't know that there is much I can say. I have had, of course, very limited experience of the kind of survey that a government carries through, because in my own travels my work has been done entirely by myself, without assistance from anybody, and carried on in connection with a whole lot of other work, but I carried on my survey on the system explained to-day, that is, Colonel Tanner's system, and found it admirable so far as my possibility of accuracy went. My work fitted on to the triangulation carried on previously by Mr. Minchin, and our results absolutely tallied. There is no doubt whatever that in rough mountainous country, unless a great deal of time can be given to it, it is almost impossible without very great expenditure, especially in this Patagonian region, with its great forests, to carry out careful triangulation, and the system of the Chilean Government is, I think, a very good one. There are many questions, in matters of detail, which I think I must postpone asking until I get an opportunity of speaking to Dr. Bertrand personally. He has certainly put his subject before us in a very interesting manner.

Prof. BERTRAND: With regard to Sir John Farquharson's question, as to whether there was any connection between our polygonal survey and a triangulation, I must say there was a trigonometrical survey many years ago in Chile, but this, I am sorry to say, has been found very defective. Of late years the staff of the army has begun a triangulation in the province of Santiago, but up to now we have only gone on a limited scale. So far as we have had this survey as a check on our polygonal survey, they have tallied well; but, as I have said, we have not done very much—not really enough to use as a precedent. The only check we have had on our work has been the telegraphic one which I have mentioned. I should say that triangulation may find this work not absolutely accurate, but accuracy here must be considered in connection with the purpose of the work. A difference of 100 metres in the breadth of a country is not a consideration when only roads and such things are the objects of the survey, and then it should be borne in mind that it was a question of making the survey in a very small way or not at all; because, if the

triangulation had been attempted, it must have been very perfect, and it could not have been carried through in such a way. You must please excuse me, but I have not sufficient command of your language to speak at length in such a way as I should like.

The PRESIDENT: I cannot doubt but that eventually there will be a rigorous system of triangulation throughout Chile, but it will be a work of extreme difficulty, and cannot be expected to be executed for some years to come. In the mean while this polygonal system has been thought out and adopted, and I think the meeting will wish to congratulate Prof. Bertrand and his colleagues for the admirable way in which it appears to have been executed—for the way in which every point connected with it, both as regards computation and adaptation of instruments, has been carefully thought out. He has given us a very interesting account of this system of survey, and I am sure the meeting will wish me to express to him our thanks for what he has told us. I therefore propose a vote of thanks to Prof. Bertrand.

THE MONTHLY RECORD.

ASIA.

Mr. Skeat's Expedition in the Malay Peninsula.—Some of the least-known portions of the Malay peninsula have lately been explored by an expedition under Mr. W. W. Skeat, which included several scientists from Cambridge University. From Sengora, on the east coast of the peninsula, the whole of the districts forming the extreme south-east of Siam were visited, after which attention was turned to the portion of the west coast opposite Pulo Penang. Mr. Skeat ascended the almost unknown Lebir (Libi) river, and visited Mount Gunong Tahan, probably the highest mountain in the peninsula. Valuable results in the provinces of zoology, botany, and ethnology were obtained. Mr. Skeat's full report will be awaited with much interest.

Dr. Sven Hedin in the Lob Nor Region.—Writing from Yangi-kul on May 14 last, Dr. Sven Hedin gives some details respecting his recent work in the region of Lob Nor, with the results of which, he says, he has every reason to be satisfied. He had just returned from a two months' journey, during which he had followed the old river-bed of the Kum-darya, first discovered by Kozlof, until, to his great satisfaction, he found it enter an old lake, now dry, which in his opinion cannot but be the ancient Lob Nor. On the shore he found the ruins of a town with artistic sculpture in wood, as well as an old road. One day's march north of Kara-koshun he came upon a new lake of large size, formed by a new eastward-flowing arm of the Tarim. The result is, he says, to fully confirm the theories put forward by him in his book 'Through Asia.' Dr. Hedin has made very complete surveys along his route, and has fixed the positions of forty points astronomically. After resting during the summer in Northern Tibet, he hopes to revisit the Lob region, and in January, 1901, to cross Tibet to the sources of the Indus, finally returning through India.

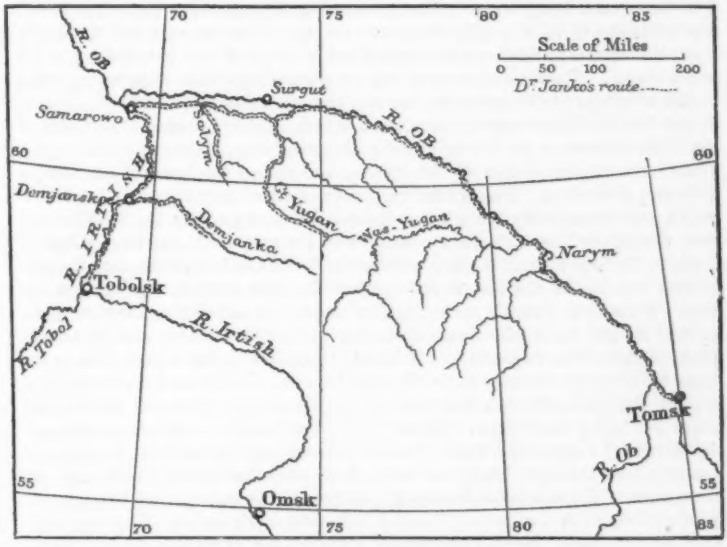
Railway Surveys in China.—Although all projects for the opening up of China by means of railways, etc., under European superintendence are for the time being in abeyance, there can be little doubt that the recent movement in that direction is only temporarily arrested by the present state of disorder. Whether or no the schemes already set on foot will be eventually carried out in their original form, the work done in the way of preliminary reconnaissance is bound to prove of value in one way or another. The report made to the Peking Syndicate on the

results of surveys carried out on behalf of that body by Mr. J. G. H. Glass contains matter of much interest with respect both to the commercial and physical geography of North Central China, particularly the former. The work was carried out by a large and competent staff of engineers, both military and civil, and the results may be relied on as thoroughly trustworthy. The concessions accorded to the Peking Syndicate were concerned with the mining districts of Honan and Shansi, and the opening up of communications between the same and the navigable waters and trunk railways of the empire. The coalfields to which especial attention was directed were those of Tse-chau on the southern borders of Shansi, and Siu-wu in Northern Honan. To reach these, it was at first proposed to utilize the navigation of the Han river as far as Fan-cheng, and thence construct a line of railway north to Honan, with a continuation across the Hwang-ho to the districts in question. A shorter line east from the latter to the head of navigation on the Wei river was also contemplated, as well as a westward extension through Tung-kwang, the "Gate of Central Asia," to Si-an-fu. Mr. Glass's party was broken up into sections, and more or less detailed surveys were executed along all these lines. Mr. Glass himself visited the coal-mines, and found that previous reports as to the amount and quality of the deposits were fully confirmed, excellent coal being produced at a cost, at the pit's mouth, of from 1·55 to 2·3 shillings per ton. Given adequate transport facilities, for want of which this great mineral wealth is at present all but neglected, Mr. Glass thinks that the coal of Shansi and Honan should find an enormous market, not only in the densely populated plains of China, but at Shanghai, Hong Kong, and even at San Francisco. The examination of the Han river proved that the obstacles to navigation are greater than had been anticipated, and Mr. Glass strongly urges the adoption for the railway of a route south-east to Pu-kau, on the Yang-tse, opposite Nanking, which would allow of the direct loading of the coal into ocean steamers. A rapid survey of this route was made, and showed that no exceptional difficulties would be encountered. Of all the contemplated lines that to Tse-chau, in Shansi, involves the greatest engineering difficulties, the present road descending from the plateau to the plains by gradients sometimes as steep as 1 in 4. A fairly satisfactory route was however found, and Mr. Glass considers that, in view of the possible development of the iron industry of Shansi, this line must eventually be constructed. One of the most important engineering works will be the bridging of the Hwang-ho, for which a very satisfactory site has been obtained. The cost has been estimated at £250,000. It is remarkable that throughout the operations of the surveyors most cordial relations were maintained with the inhabitants, who seem to have manifested no anti-foreign feeling, but who are more than once described as anxious for the railway. Detailed reports on the country traversed by the various officers in charge of the parties are given as appendices.

Japanese Trade in 1899.—A recent consular report on the trade of Japan during 1899 shows that, with the exception of 1898, the year under review showed a larger volume of foreign commerce than any year since the first opening of the country to foreign trade. The year was in some respects a critical one, owing to the fact that the new customs tariff took effect from January 1. In anticipation of the new duties on imports, these had reached abnormally high figures during the latter part of 1898, with a result that a great falling off took place during the first half of 1899. A marked recovery, however, set in during the last six months of the year, with the result that the total trade fell only slightly behind that of 1899, while the exports showed an increase of just over £5,000,000. Raw cotton is the most important item in the import list, and its amount continues to increase rapidly, owing to the steady development of the cotton-spinning industry, which actually

now yields a surplus of yarn and tissues for export. This fact, together with the recent revival in the raw silk trade, and an exceptional rice harvest, are the chief causes in the satisfactory returns of exports. The manufacture of woollen goods has also made great strides during the past few years. The import of iron and steel manufactures showed a marked falling off, but pig-iron, obtained chiefly from Great Britain, maintained its position. Chinese iron seems, however, likely to be a serious rival both to English and American pig-iron in the future. Manufacturing Japan is said to be driving agricultural Japan into the background, and the importation of food-stuffs other than rice becomes greater year by year. Of the old open ports Hiogo and Osaka taken together increased the lead over Yokohama, which had been gained in 1898, as regards the total value of trade. Of the twenty-two new ports opened to foreign trade on August 4, 1899, Shimonoseki and Moji—practically one port, as they are separated only by a strait 1½ mile wide—are of most importance at present. Japanese shipping shows a great and continued development, while German and Russian enterprise is very marked, contrasting strongly with the apathy shown by British shipowners. The British share in the total shipping was 40 per cent., but showed a slight falling off as compared with 1898.

Dr. J. Jankó's Ethnographic Researches in Siberia.—Dr. Johann Jankó, superintendent of the Ethnographical Section of the Hungarian Museum at Budapest, carried out in 1898, on behalf of Count Eugen Zichy, a thorough investigation of the ethnographic relations of the Ostiaks, from the point of view of their



DR. JANKÓ'S ROUTES BETWEEN THE OB AND THE IRTISH.

racial and linguistic affinities with the Hungarians. The following notes are taken from a paper lately read before the Hungarian Geographical Society, in which Dr. Jankó gave some account of the results of his researches. The region visited was the tract of boundless forest between the Irtish and Ob, into which the traveller

pushed his way from three sides, advancing 93 miles up the Demyanka valley, 180 miles up that of the Salym, and 370 miles up that of the Great Yugan. The total distance travelled during the space of two and a half months was over 1800 miles, all by canoe, the only means of locomotion in this region. The inhabitants of this vast primeval forest are Ostiaks, and had never previously been visited by a European. Dr. Jankó found abundant opportunity for the observation of valuable ethnographical and anthropological facts. He made a collection of some 300 objects, took a similar number of photographs, and about 5000 anthropological measurements and drawings relating to 125 individuals. He procured likewise thirty skulls and two complete skeletons of the forest Ostiaks. The return journey to Europe was made *viâ* Tomsk. The working up of this material has already been almost completed, and will shortly appear among the collected results of Count Zichy's journeys, of the ethnographical section of which it will form the second volume, under the title 'Anthropologische Studien über die Ostjaken.' The first volume, also from the pen of Dr. Jankó, has already appeared under the title 'Herkunft der Magyarischen Fischerei.'

AFRICA.

The Hostains-D'Ollone Expedition.—The fourth number of *La Géographie* contains some additional details respecting the expedition under MM. Hostains and D'Ollone from the Ivory Coast to the Sudan, to which reference was made in our May number. Entering the basin of the Du, as the Kavalli is known to the natives (the latter name being in use by Europeans only), the expedition reached, in 5° 45′, the confluence of its two main branches—the Duo from the east, and the Duobe from the west, of so nearly equal size that neither could at once be laid down as the main stream. The determination of this question being of some importance, owing to the assignment to France of the course of the river in the agreement with Liberia, it was decided to first explore the western branch. After a stay in the country of the Graorcs between the Duobe and the Duo, the former river was crossed, and a route taken for the district of the Palubes who occupy the basin of the Bhue, a tributary of the Duo. This led through an uninhabited tract two days' journey in width, and subsequently across a mountainous district separating the Kavalli basin from that of the Non, a stream not marked on the maps. At the large village of Paolo in the Sapo country it was found that the Duobe and Duo, which were thought to have been left to the east, flowed north of the then position, coming from the west. Proceeding through an uninhabited forest, the expedition therefore again crossed the two rivers, the Duobe being only some 20 yards wide at a distance of about 40 miles from its source. The Kavalli (Duo) here makes a great bend to the west, enclosing the territory of the Bos and Boniaos. It was once more crossed at a point where its width was 100 yards and its depth some 30 feet, its waters being much swelled by heavy rains. Beyond 7° N., the forest still continuing, the expedition entered a region the tribes of which differed entirely, both in language and customs, from those previously met with, all of whom had seemed to belong to the same stock. The new tribes, known generally as the Gons, practised weaving and were clothed, while further south the people went nearly naked. They are, however, all cannibals. Being treacherously attacked, the expedition fought its way north for six days, and passing east of the Nimba mountains (6000 to 7000 feet) reached Nzo, the furthest point in this direction which had been gained from the north. Beyond this the forest became thinner, finally ceasing at Mananko. Besides exploring the whole Kavalli system, the expedition determined the water-parting between that river and the more western streams, fixing the position of the sources of the Sino, Dubhe, and San Pedro.

The French in the Lake Chad Region.—The news received early in August from Lake Chad shows that the career of conquest of the adventurer Rabah has at last been closed by his defeat and death in battle with the French forces united under the command of M. Gentil. These included, in addition to the latter's own expedition, which made its way north from the Congo, the forces brought from Algeria by MM. Foureau and Lamy, and from the Niger by Lieut. Joalland, on whom the leadership of the expedition, originally despatched under Voulet and Chanoine, finally devolved. Both these parties had made their way round the east shores of Lake Chad, and joined M. Gentil on the lower Shari. After pacifying the country around Zinder, Lieut. Joalland set out for Lake Chad, which was reached on October 23, 1899. French influence was established in Kanem, after which the expedition proceeded south, reaching Gulfei, on the Shari, December 11. The same place was reached in March last by the Foureau-Lamy expedition, which had left Zinder in December in two columns, afterwards taking the same route through Kanem as Lieut. Joalland. The decisive battle was fought a few miles north-west of Kussuri, at the mouth of the Logone. Although victorious, the French have had to mourn the loss of Major Lamy and of Captain Cointet, both of whom fell in the action. M. Foureau is said to have reached Brazzaville, *en route* for France, on July 11, being thus the first European to connect the Mediterranean with the Congo by his itinerary. A journey through the unexplored districts between the Shari and the Sangha is said to have been undertaken in May last by MM. Huot and Bernard.

Currents of the Congo Mouth.—A report by Commander H. E. Purey-Cust, issued by the Hydrographical Department of the Admiralty, gives the results of observations made in 1899 by H.M.S. *Rambler*, with a view to throwing light on the conditions of the under waters at the inner end of the Congo cañon. In addition to the determination of the density and temperature of the water at various depths, the operations included the measurement of the rate of the undercurrents and a comparison with that at the surface. The results are summarized thus: "The observations appear to show that the fresh water of the Congo extends from the surface to the bottom until reaching the head of the Congo cañon just below Kissanga, when it encounters a body of salt water filling this deep gully. It then runs over this denser water with decreased depth and increased velocity, the layer of fresh water being deeper with the ebb tide and shallower with the flood, both decreasing the broader the river becomes, until, from being from 3 to 5 fathoms deep just below Bull island, it is only a few feet deep after passing Bulabemba point. This deep body of salt water is either perfectly still, or has a very slight tidal flow (0·2 to 0·5 knots per hour) up-river with the flood, and down with the ebb tide." The method found most successful for the determination of the undercurrents was one in which a conical canvas drag, made fast to a 14-lb. lead, was attached to the wire of the steam-cutter's sounding-machine, the wire being kept vertical by adjusting the speed of the engines and careful steering. Determinations of the nature of the bottom were also made.

Expedition to the Source of the Zambezi.—News has been received respecting a visit to the source of the Zambezi, made early this year by Major Colin Harding, commanding an expedition to Barotseland for the purpose of recruiting a force of native police. From the Victoria falls the Zambezi was ascended in boats, which were finally abandoned at a series of small but picturesque cataracts in 11° 38′ 55″ S. The loss of two boats with stores involved a scarcity of food, and the carriers refused to advance; Major Harding, however, pushed on with a few trusty followers, and reached the source of the river on March 17, at a spot where seven springs shadowed by splendid trees burst forth at an elevation of 4950 feet.

The position is given as in 11° 33′ 45″ S., 24° 51′ E. Major Harding has since proceeded westward to explore the country between the Zambezi and the West Coast, where his work may be expected to supplement that of Major Gibbons's expedition. The Zambezi sources were, it will be remembered, visited last year by Major Gibbons on his journey to the upper Congo.

The Province of Gaza, Portuguese East Africa.*—A useful sketch of the Portuguese province of Gaza, occupying the country watered by the lower Limpopo and its left-bank tributary the Chengane, was last year given to the public by Captain Gomes da Costa, as the result of personal observations during military service in the colony. The author describes concisely the physical geography, native population, climate, trade and resources, communications, administration, etc., of the country, as well as the principal historical events, especially the Zulu invasion, of which it has been the theatre during the present century. He divides the territory into two distinct types of surface, distinguished by the native names "bilene" and "mananga." The former is the plain-country (occurring in the river valleys), with rich covering of humus, well provided with water, and admirably suited for agriculture; the latter, sandy waterless tracts, at a higher elevation and covered with thorny scrub. The geological formations are as a rule sedimentary. Besides the "bilene," which owes its fertility to its annual inundation by the rivers, the only fertile district is that of the Mchopes (a section of the Tonga race which gives its name to the administrative division on the coast east of the Limpopo mouth). In the coast region the rains begin in November, the greatest fall occurring in the following three months, while March and April are showery. June, July, and August are the driest and coldest months. In the interior very little rain falls. The mountainous districts bordering on the Transvaal and the coast zone between the Limpopo and the Zavalla are the most healthy parts of the province. Commerce has received an impetus from the influx of Hindu and other traders since the capture of Gungunyana, but it is one of importation only. The writer thinks, however, that the country possesses great resources, which might give rise to a large and paying export trade.

The Basin of the Komati, South-East Africa.—M. A. Grandjean, secretary of the "Mission Romande," who, during his missionary labours at Antioka, between the Limpopo and Delagoa bay, had many opportunities of becoming acquainted with the geography of the surrounding region, contributes to the *Bulletin de la Société Neuchateloise de Géographie* for the present year a clear sketch (with map) of the system of the Komati, the river which enters Delagoa bay from the north. This river, which drains the northern part of the Drakensberg range, is of greater importance than might be gathered from its appearance on the map, being comparable both in size and length to the Rhone or Loire. Its course is marked by great bends, which add greatly to its length, its entry into Delagoa bay being from the north and north-east, instead of, as might have been expected, from the west. M. Grandjean describes fully the hydrographical system of the river in the part with which he is acquainted, *i.e.* the plains which intervene between the mountains and the sea. The country south of the river, within its last great bend, presents some unusual characteristics, its core being formed of a series of sandy ridges separated by swampy depressions without outlet. The tributaries of the river are connected with a series of lakes and backwaters, which in flood receive water from the main stream, and are finally merged in a general inundation. To the north this region of swamps supplies a connection with the basin of the Limpopo. M. Grandjean was able to trace the course of a depression,

* Cap. Gomes da Costa. Gaza, 1897-98. Lisbon: Gomes, 1899.

which at the time of his visit—the height of the dry season—did not contain water throughout, but showed a well-marked bed, by which, according to native report, water-communication is possible during two months in the year. The writer suggests that, if improved, this channel might facilitate the transport of grain from the rich Limpopo valley to the mining centres of the Transvaal, the Komati being navigable to the point where it approaches most nearly the Lourenço Marques railway. The map accompanying the paper is of some original value.

The "Daily Telegraph" Expedition from the Cape to Cairo.—Mr. Lionel Dècle, leader of the *Daily Telegraph* expedition, which is making its way northwards through the whole length of Africa, writes from Fort Jameson, North-Eastern Rhodesia, giving some details respecting the progress of the expedition down to February last. The point mentioned had been reached *viâ* Salisbury, Tete, and Lake Nyasa, no new ground having of course been broken, the object of the expedition being to study the present condition and the resources of those parts of the continent which already await development. Mr. Dècle has, however, taken a number of hypsometrical observations with aneroid, to determine the relative altitude of the various districts traversed. Daily meteorological observations have also been taken with the aid of Mr. G. F. Powell. The rainy season which occurred early in the present year was unusually severe, rains having commenced early and been likewise extremely heavy. Travelling was entirely interrupted in January on this account. Tete, on the Zambezi, was found to be extremely unhealthy, all the white men and most of the natives of the party being laid up with fever. Mr. Chapman, the second in command, was obliged by ill health to resign his post on reaching Blantyre.

Beira and District.—Mr. McMaster's 'Report on the Trade of Beira for 1899' (Foreign Office, Annual No. 2427, 1900) contains several matters worthy of note. The extension of the Mashonaland railway line from Umtali to Salisbury has been completed, and the work of widening the narrow gauge of the Beira railway to Umtali, which was commenced in May, has been finished to within 100 miles of Beira. The new iron bridge spanning the Pungwe river at Fontesvilla has also been completed. The distance from Beira to Umtali, formerly 222½ miles, will be reduced to 205 miles. Owing to delays occasioned by the war in South Africa, the line from Salisbury to Gwelo and Buluwayo, distances respectively of 150 and 300 miles, will probably not be open for traffic before March, 1901. Work has not yet commenced in connection with the projected Beira-Sena railway; it is pointed out that this line, once completed, would tap a very fertile area of Zambeza, and would attract further trade to this port. A census of the resident population of Beira was taken on December 31, 1899, and, compared with the return for the previous year, shows that the European population of 1467 has increased by 295. Considerable progress has been made with the Chiveve reclamation and embankment scheme, which will shortly be completed. The filling up of this creek, formerly a bed of malaria-breeding mud, has tended to the improvement of the health of the inhabitants of Beira. Indiarubber and coconut planting has been taken up in the district, and, it is thought, should become a profitable industry in the future. A large concession of land has been given in the Sabi valley, where it is intended to cultivate the *Landolphia* vine, which yields rubber freely; it is also proposed to cultivate the *Hevea Brasiliensis*, from which the true "Para" rubber is extracted. The *Kickxia* variety is also being tried on the Zambezi and Buzi rivers. Other industries of recent date in this district are the manufacture of dynamite and other explosives for mining purposes, and of bricks and tiles of all forms.

Mount Kilimanjaro.*—Dr. Hans Meyer's latest work forms a fitting crown to his persevering labours for the elucidation of the geography of the great East African mountain. It makes a sumptuous volume, richly illustrated from the author's photographs and from the sketches of his companion, the artist Ernst Platz, presenting altogether a complete and fascinating picture of the many aspects of nature represented between the forests of the lower slopes and the icy masses which crown the summit. The text describes the author's fourth and latest expedition to Kilimanjaro, and is remarkable for the amount of information which it conveys regarding all branches of natural science, while at the same time losing nothing of its general interest. Geology, plant and animal life, and climatic phenomena are alike dealt with in a clear and instructive manner, and the book must long remain an invaluable mine of information on these subjects. The investigation of the glacial phenomena of the mountain formed one of the main objects of Dr. Meyer's journey, and it is with respect to these, perhaps, that the book presents the most that is new. A separate chapter summarizes the facts so far available regarding the present and past glaciation of East Equatorial Africa, while another treats of the volcanic phenomena and structure of the mountain. Dr. Meyer's surveys added much to our knowledge of its topography, and these results are embodied in an excellent large-scale map. An extensive series of barometrical observations for altitude also gives results of much value.

The German Pendulum Expedition in East Africa.—The expedition under Lieut. Glauning and Dr. Kohlschütter, for the determination of the force of gravity in the neighbourhood of the various East African rift-valleys (*Journal*, vol. xv. p. 178), returned to the coast early in the present summer after successfully accomplishing its task. An outline of the work accomplished is given in Nos. 1 and 2 of the *Mitteilungen aus den Deutschen Schutzgebieten* for the current year. According to the programme which had been sketched out, pendulum observations were to be made in the case of each rift-valley at a series of stations as far as possible on a straight line, some being on the level of the bounding plateaux, and others in the valleys themselves, in order that the relative intensity of the force of gravity might be determined. This rule was generally adhered to, though the conditions of the country, in many parts uninhabited and without the means of subsistence, occasionally prevented the establishment of the stations at quite the most favourable spots. After finishing the work in the neighbourhood of Rukwa, the expedition crossed the Fipa plateau to Tanganyika, where observations were made at stations on either side of the lake. That on the eastern plateau was chosen about midway between the Rukwa and Tanganyika escarpments, while the eastern lake station was at the German post of Kasanga. The western lake station was on Cape Bungwe, close to the Belgian post at Moliro, near the frontier of British Central Africa, and the plateau station at Kakoma, about 5 miles from the escarpment. During the dhow voyage to Ujiji, some of the instruments, though fortunately not the pendulum apparatus, suffered somewhat from the penetration of water into their cases during a shipwreck. At Ujiji, in addition to the usual observations, the longitude was determined astronomically, though here, as universally through the journey, operations were much hindered by clouds. The route was continued to Tabora, and thence north-east to Manyara, Nyarasa, and the eastern rift-valley. From Sonyo, north of the Natron lake, the expedition turned south-east to Kilimanjaro and the coast. In addition to the pendulum observations, the magnetic declination was determined at a large number of

* 'Der Kilimanjaro.' Reisen und Studien. Von Prof. Dr. Hans Meyer. Berlin: Reimer. 1900.

stations, and many contributions to the more accurate mapping, as well as to our general knowledge of the regions traversed, made. In the more southern parts Dr. Köhlschütter was able to link his new work to the triangulation of the Anglo-German Boundary Commission, on which he had been the German representative. Unfortunately, the loss of one of his journals has somewhat marred the completeness of his results. With regard to Rukwa, it is stated that the existing extent of water corresponds to that of the original lake, and that the larger area observed some twelve years ago was the result of inundations.

East African History.*—The recently published work of Herr Strandes is a useful contribution to the history of European dealings with the African continent. Less is perhaps known respecting the period of Portuguese influence on the northern half of the east coast than of any other section of African colonial history, for though dealt with in works—both ancient and modern—which treat of the Portuguese Eastern Empire as a whole, no independent work has been devoted to the fortunes of that people in the particular region in question. The author shows a wide acquaintance both with the original sources of information and with the writings of modern authors with any bearing on his subject. The former include not only the standard historians who treat of the earlier portion of the period, but the scattered data for the decline of Portuguese power, some of which have been published at Lisbon and Goa, while others still remain buried in the repositories of original records. The greater part of the story of course centres at Mombasa, the various fortunes of which are traced down to its ultimate abandonment by the Portuguese in 1729, though other places on the coast, such as Kilwa, Melinde, and Brava, meet with a fair share of attention. The chapters relating the first establishment of the Portuguese on this coast are followed by a concise but instructive sketch of its history under Mohammedan (Arab, Persian, and Indian) influence, in which also some details respecting the ancient Chinese dealings with East Africa are given.† Herr Strandes considers that the stage of culture to which the East African centres had attained before the arrival of the Portuguese has been frequently over-estimated, and points to the fact that in all essentials the native life on the coast is identical with that four hundred years ago as an illustration of the stagnation attending Mohammedan civilization. He also thinks that the Portuguese power—which has left next to no traces behind it—was always exceedingly limited on this part of the coast. It is extremely doubtful whether any accurate knowledge was gained of the interior. A special feature of the book is the series of excellent photographic illustrations of ancient buildings, including some, such as the mosque at Kilwa, anterior to the arrival of the Portuguese. It was the interest aroused by these which led the author, who is personally acquainted with the East African coast-lands, to the inception of his task.

AMERICA.

Shipping and Ship-building on the American Lakes.—An interesting report by Mr. T. Erskine, British vice-consul at Chicago, on the shipping and ship-building of the American lakes, has been issued by the Foreign Office (Miscell. Series, No. 526). Mr. Erskine gives a vivid idea of the commercial activity which prevails on the great lakes, and which is, he says, annually increasing. An event

* 'Die Portugiesenzeit von Deutsch- und Englisch-Ostafrika.' Von Justus Strandes. Berlin: Reimer. 1899.

† The author has the authority of Prof. Brinckmann, of Hamburg, for stating that the China ware often collected by Europeans on the coast at the present day, dates, not from the early period of Chinese intercourse, but from about a century ago.

of much importance for the future of this trade has been the opening of the improved Welland canal, the locks on which will now allow the passage of vessels 270 feet long, 45 feet wide, and drawing 14 feet. British vessels may, it is thought, obtain a share in the lakes' trade, though it is open to question whether such as can pass through the Welland canal will be able to compete with the big American freighters, some of them capable of carrying 7000 tons of grain at each trip, which ply in connection with the railways to New York. Already the Canadians are advocating the construction of a canal from Georgian bay to the Ottawa river, giving a direct waterway to Montreal, and shortening the distance from Chicago and Duluth by about 400 miles. It is hoped that, if constructed, this canal would allow the passage of larger vessels than can pass through the Welland Canal. Of a total of £2,824,282 representing the direct imports to Chicago in 1899, Great Britain is credited with £653,546, nearly all of which must have come through the United States. Grain and other articles destined for Europe go principally to Buffalo, where they are transhipped either to barges to pass through the Erie canal or to the railways. There seems, therefore, an opening for British ships to obtain a share in this trade. The total fleet of the great lakes includes 3435 vessels, apart from Canadian vessels, which, if added, would bring up the gross tonnage to some 6,000,000 tons. Chicago, though at present showing the largest amount of business, is running the risk of losing some of her trade owing to the difficulties of the Chicago river. Manitowoc and Milwaukee are both rising ports. The shipbuilding yards on the lakes are now doing a large business, and it is thought that the enlargement of the St. Lawrence canals will enable them to compete with Altantic coast shipbuilders. A yard is being built by the largest firm of the latter at Collingwood, Ontario, a town with the promise of a bright future, probably destined to be a great shipping port for the ore of the Laurentian mountains. The American vessels are built with every possible labour-saving device, and improved machinery capable of unloading ore at the rate of 300 tons per machine per hour, has lately been adopted.

Trade and Industry of South Carolina.—A recent consular report on the trade of Charleston and district for 1899 records a considerable falling off in the export of raw cotton both from Charleston and Savannah, this being accounted for by the unusually high prices which prevailed and the great demand for cotton on the part of southern manufacturers. South Carolina is rapidly taking a prominent position as a cotton-manufacturing state, and it is thought that before many years the bulk of the cotton grown in America may be manufactured in the states where it is produced. At the present rate of increase, the American mills may soon equal the English in their facilities for production, while manufacturers trust to the development of the markets in the Far East to enable them to dispose of their whole output. The phosphate and lumber trades have shown a marked improvement, the output of the Tennessee phosphate mines having in particular largely increased. The report includes particulars respecting the experiments at tea-cultivation lately made at Pinehurst. The area planted now exceeds 50 acres, from which the returns have been good, while the tea produced is of a high grade. The feasibility of the culture, so far as climate is concerned, has been conclusively tested by the severe cold of last winter. In view of the high price of labour, success will depend on high field productiveness, the use of machinery in the factory, and the growth of such qualities of tea as cannot be transported from the East without deterioration.

Geology and Geography of Jamaica.—The recently issued monograph by Mr. R. T. Hill on the geology and physical geography of Jamaica is an important contribution to our knowledge of the island under those aspects.

The work, which forms the thirty-fourth volume of the *Bulletin* of the Museum of Comparative Geology at Harvard College, is based on surveys made by the writer for Prof. A. Agassiz. It supplies an excellent example of the way in which the present features of a region may be elucidated by a knowledge of its geological history, and besides acquires a special importance from the fact that the phenomena observed in Jamaica may be taken as typical of the geological development in the Antillean region as a whole, so that new light is thrown on the wider questions relating to the American continent. In spite of the attention devoted in the past, especially by the official survey, to Jamaican geology, a renewal of research was much needed, for, in the writer's opinion, previous work had failed to solve the essential problems of the succession and age of the strata, the confusion being due to the premature death in 1862 of Mr. Lucas Barrett, who alone was able to correlate the work of his subordinates. Of the several sections of Mr. Hill's work, the first, which gives a clear sketch of the configuration of the surface, is of the most strictly geographical interest. At the outset, the importance of the position of the island in the centre of the American Mediterranean (strikingly shown by the diagram on p. 17) is explained. The outline also, when analyzed, is of great significance, for while the general trend of the island is east and west, nearly half the coast-line is diagonal to this cardinal direction, marking a survival from the earlier days of Antillean history. Mr. Hill divides Jamaica into (1) a nucleus of mountain ranges in the interior; (2) an elevated limestone plateau surrounding the mountains and ending abruptly towards the sea; (3) the coastal bluffs of the outer margin of the plateau; (4) the low coastal plains. A very marked peculiarity is the abrupt sea face of the mountainous upland, to which Mr. Hill gives the name of "back coast border." The secondary features are interior valleys and basins in the summit of the plateau, certain coastal benches and terraces carved out of the margin of the back coast border, and the drainage valleys. The mountains and the plateau show two very different types of relief, the former being marked by knife-edged salients and angular re-entrants, while the hills of the latter present uncorrugated, densely wooded slopes. The present features are of complex origin, being due to two periods of mountain-making; two great epochs of subsidence; and a later uniform elevation, which added the modern coastal phenomena. The configuration extends below sea-level, which indicates that once the island was more extensive than at present. The geological and topographic evolution of Jamaica is fully dealt with in the fourth section of the work, and the wider aspects of West Indian history in the sixth, at the close of which the probable course of events connected with the various uplifts is sketched. The last great orogenic movement of the kind was in Oligocene or Miocene time, and by it many of the islands became connected, being severed by submergence into their present outlines in Miocene or Early Pliocene.

Trade, etc., of Jamaica, 1898-99.—The recently issued report (Colonial Report, Annual No. 283) by the Governor of Jamaica gives hopes that the recent period of depression is passing away, and that a fair measure of prosperity may again be enjoyed. Both exports and imports show an improvement in value, the latter under every head except manufactured articles. During the decade ending with the year under review, the greatest proportional increases occurred in the produce of fruit (bananas and oranges), cacao, ginger, and pimento, the last three, however, being all minor products. The export of bananas—now the mainstay of Jamaican agriculture—reached a value, in 1898-99, of £168,000, and that of oranges, £123,000. After a persistent decline for many years, the sugar industry showed some improvement. With two-thirds of the island still uncultivated, this is necessary for its prosperity as well as the fruit industry, and not the substitution

of one for the other. Hopeful signs of an intelligent determination to meet changed conditions, by improvement of methods, etc., are said to be apparent. The proportion of trade carried on with great Britain has much declined of late years, fruit, which now forms over forty per cent. of all exported products, having been sent almost entirely to the United States.

Remeasurement of an Arc of the Meridian in Ecuador.—The projected revision of the measurement, originally carried out on behalf of the French Academy by La Condamine and his associates, of an arc of the meridian on the tableland of Ecuador, has now come a step nearer realization. It will be remembered that an expedition was despatched last year by the French Government (*Journal*, vol. xiv. p. 323) to carry out the preliminary examination of the ground necessary for the proper maturing of the plans. Captains Maurain and Lacombe, to whom this work was entrusted, arrived at Quito in July of last year, and during the next four months went over the whole ground to be covered by the operations, from the frontiers of Peru to those of Colombia. In the north they fixed the positions of ten new geodetic and one astronomical station, and chose the ground for a base-line. In the south two new base-lines were chosen, one of them situated within Peruvian territory, and the positions of fifteen new geodetic stations were fixed. In the course of their labours some thirty of the peaks of the Andes were ascended. Their report has now been presented, and Captain Maurain has also given an account of the work done in the seventh number of *La Géographie*. He estimates that to complete the undertaking the co-operation of five geodeticians for four complete years will be necessary. The advice and co-operation of the French Academy of Sciences, the present representative of the body from which La Condamine and his companions received their commission, has been asked by the French Minister of Public Instruction. A committee has been formed, which has reported on the methods to be adopted in the *Comptes Rendus* of the Academy for July 23 (vol. 131, No. 4). The principal point on which a decision has to be arrived at is that of the number of degrees to be included in the proposed arc. The original proposal was for one of 6°, but a suggestion has been made that by reducing the length to 4½°, from the Colombian base to that of Targui, the most difficult and costly part of the work would be avoided. The Academy committee, however, strongly urge the retention of the original plan, pointing out that the value of the measurement of the larger arc would be more than proportional to its length, and that it is desirable that the new results should be comparable with those obtained in mean latitudes by the measurement of arcs of large amplitude.

POLAR REGIONS.

German Arctic Expeditions.—Two German expeditions, each more or less concerned with the search for traces of Andrée, are proceeding this summer to the Arctic. The one under Captain Bade, of Wismar, in Mecklenburg, has for its objective East Spitsbergen, Kong Karls Land, and Franz Josef Land, all of which the leader proposes to carefully examine. He also hopes to learn some tidings of the expedition of the Duke of the Abruzzi. The other expedition was to start from Hamburg, under Captain Bauendahl, about the middle of August. Its programme is somewhat more ambitious, the pole itself, or any still undiscovered land that may lie before it, being the ultimate goal aimed at. With a sailing vessel of only 44 tons register, the leader hopes to push into the pack north of Spitsbergen, but in case of progress being entirely stopped, he is prepared to abandon the ship, and continue his route over the ice. He takes with him fuel and supplies for two years.

The Voyage of the "Windward."—The *Windward*, Captain Samuel Bartlett, carrying to the far north a fresh supply of stores of all kinds for the Peary expedition, sailed from Sydney, Cape Breton, on July 20 last. Under favourable conditions, it was hoped that Etah, in North Greenland, Peary's base of operations, would be reached in three weeks from the date of departure; but subsequent reports show that unexpected difficulties, involving a serious delay, have been encountered. The *Windward*, as reported in a telegram from St. John's on July 31, had met with an accident to her machinery, and had, besides, found the ice off the Labrador coast so heavy that doubts were entertained as to the success of the voyage.

GENERAL.

Geography at Oxford.—The programme of arrangements for the approaching Michaelmas Term has been issued by the Oxford School of Geography. The proposed courses of lectures, by which the year's instruction for the University Diploma of Geography will be opened, will deal with the following subjects: "The Historical Geography of the British Islands" and "The Development of Geographical ideas" will be dealt with by Mr. Mackinder; "The Atmospheric Circulation," by Mr. Dickson; "The Geographical Cycle," by Dr. Herbertson; and "The Geographical Development of the Roman Empire," by Mr. Grundy. In addition to these courses (which commence during the third week in October), students will be able to avail themselves of instruction on Practical Astronomy and Physical Geography by University professors, while practical instruction will be given at the laboratory. The first diploma examination will take place in June, 1901. It has been decided to offer annually a scholarship of the value of £60, which will be open to members of the University of Oxford who have taken honours in one of the Final schools of the University. The examination for this will be held on October 9, 1900, and candidates must send in their names to Mr. Mackinder not later than October 3.

The Silk-production of the World.—An interesting sketch of the past history and present condition of the silk-producing industry throughout the world is given in the *Annales de Géographie* for March 15, by Prof. V. Groffier. After briefly describing the methods of culture and pointing out the geographical causes by which the industry is localized, the writer passes under review the different regions of production, giving an account of the introduction of the industry in each, and estimating the prospects of future development. Maps are given showing both the general distribution of silk-culture and, more in detail, the extent of production in each country in proportion to the area devoted to the industry. The most productive regions of Asia (Central China and Japan) yield, in certain districts, more than 50 kilogrammes of silk per square kilometre of surface under cultivation (about 285 lbs. to the square mile), while in India the tract of country at the head of the Ganges delta produces over 25 kilogrammes to the same area. Syria, Asia Minor, Persia, and Turkestan also supply silk for export. In Europe, although the culture is prosecuted more or less throughout the Mediterranean countries, it is only in Southern France and Northern Italy that it assumes great importance. In other parts of the world the industry is at present in an experimental stage, but indications of future development are not wanting. In Africa, though experiments made in the north have not led to great results, the industry promises favourably in the south, especially in Natal. In Mexico and neighbouring parts of Central America the climate is eminently suitable, while in the United States, Southern Brazil, the Argentine, and in most of the Australasian colonies, silk-rearing is practised on a small scale. Prof. Groffier thinks that it is the European industry which has most to suffer from the extension of silk-growing in other countries,

while in Asia the production has probably not yet reached its maximum. Fortunately, however, for the cultivation in France and Italy, the finest silks of all are produced by species of *bombyx* peculiar to those countries.

New Colonial Publication.—Under the title *Koloniale Zeitschrift*, a new serial publication has been this year started in Germany, which, while devoting itself principally to German colonial affairs, promises to be not without interest from a wider point of view. The standpoint adopted is that of an independent organ, which, while distinctly a friend of German colonial undertakings, will not hesitate to criticize impartially, when necessary, the methods and aims adopted by those responsible for colonial development. It will give information as to the world's commerce and colonial affairs generally, besides devoting special attention to foreign countries in which German interests predominate or promise to be of importance in the future. Articles which have appeared already deal with such subjects as the relations of Germany and Great Britain; the policy of expansion of the United States; the question of Marocco; and the German and Italian colonies in Brazil. The editor is Dr. Hans Wagner, and the place of publication Leipzig.

OBITUARY.

H.R.H. The Duke of Saxe-Coburg and Gotha.

Beyond the feelings of regret, and sympathy with the Queen in her bereavement, which we share with the nation at large on the occasion of the death of the Duke of Saxe-Coburg and Gotha, better known to Englishmen as the Duke of Edinburgh, our Society is affected in a special degree by the sad event, owing to the official connection which had so long existed between His Royal Highness and the Society. The late Duke had been our Honorary President for just a quarter of a century, having been elected by the Council to that post in 1875. It was in the following year that he for the first time presided over a meeting of the Society, on the occasion of the reception accorded to the late Commander Cameron, on his return from his great journey across Africa. The Duke's choice of the naval profession, taking him as it did into the most diverse quarters of the globe, brought him into close touch with geographers, and on the occasion referred to a special fitness for the post of President arose from the fact that the young traveller belonged to the same profession. Entering the navy in 1850, at the age of 14, as midshipman in the *Euryalus*, Prince Alfred became lieutenant in 1863, captain three years later, and rear-admiral in 1876. From that time he held one post after another, until in 1886 he attained the coveted position of Commander of the Mediterranean Fleet, with the rank of full admiral. While still serving in the *Euryalus*, he had visited the South African colonies, and he afterwards made cruises to North America, the West Indies, and the Mediterranean. While in command of the *Galatea* frigate, his first ship, he made a long voyage to Australia, where he met with an enthusiastic reception, afterwards visiting Japan, China, and India.

Captain M. S. Wellby, 18th Hussars.

It is with great regret that we record the death, from wounds received in battle in South Africa, of Captain M. S. Wellby, one of the most intrepid and successful of the younger generation of explorers, and an officer of great promise in his

professional career. On the outbreak of hostilities last autumn, Captain Wellby, who had only just returned from his Abyssinian expedition (*ante*, p. 292), was at once sent out to join his regiment. He passed through the whole siege of Ladysmith, and was subsequently attached to General Buller's force in the Transvaal. On July 30 he was dangerously wounded in an engagement at Mertzicht, and died at Paardekop on August 5.

Captain Wellby was born in October, 1866, being the second son of Mr. J. H. Wellby, of 1, Sussex Place, Regent's Park. He was educated at Rugby and Sandhurst, and received his commission as lieutenant in the 18th Hussars in August, 1886, becoming captain in 1894, and adjutant of his regiment in 1897, a position which he held until August, 1898. His exploring instincts first found scope in 1894, in which year he undertook his first expedition in Somaliland, reaching the Dolbahanta country, which he revisited in 1895. In 1896 he started on the journey, this time in Asia, which first made him widely known as a bold and enterprising traveller. At that time, in spite of the attention which had been devoted to Tibet as a field for exploration, a large area in the north-west had remained quite untraversed by Europeans. Those travellers who, in the previous decade, had begun to lift the veil from Northern Tibet—Bonvalot, Littledale, and De Rhins—had all followed parallel routes running from north to south, and had none of them touched the western third of the region. To cross this in its greatest extent at right angles to the routes of his predecessors, was the task which Captain Wellby set himself—a task which was most successfully carried out by him and his friend Lieut. Malcolm, who were thus the first to open a way from west to east between the great snowy ranges of the Kuen-lun system, though the feat was soon afterwards repeated, in part, by Dr. Sven Hedin. The greater part of the journey was through an entirely uninhabited region over 15,000 feet in elevation, the natural difficulties of the route being enhanced by scarcity of water and food (the travellers having at one time to subsist largely on wild onions) and the desertion of the men. Captain Wellby described this journey at a meeting of the Society in June, 1898, having in 1897 taken part with distinction in the military operations on the north-west frontier of India. In 1898 also appeared his more extended narrative under the title 'Through Unknown Tibet.'

In the autumn of 1898 Captain Wellby started on the expedition from Abyssinia to Lake Rudolf and the Nile, which was described to the Society in June last, of which the full report appears in the present number of the *Journal*. The deceased traveller had a singularly modest and unassuming manner of describing his exploits, the value of which might thus escape the notice of the chance reader, though fully recognized by the initiated. Another pleasing characteristic was his fairness and tact in dealing with native races, which enabled him to pass unscathed, where many would have met with obstruction and violence.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., LL.D., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

France. *Ann. G.* **9** (1900): 219–228. **Fournier.**

Les réseaux hydrographiques du Doubs et de la Loue dans leurs rapports avec la structure géologique. Par É. Fournier.

France. **Gaffarel.**

Les divisions administratives de la France actuelle. Par M. Paul Gaffarel.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 455–457.

France. *C. Rd.* **130** (1900): 1573–1576. **Glangeaud.**

Le volcan de Gravenoire et les sources minérales de Royat. Note de M. Ph. Glangeaud.

France. **Roux.**

Le canal de jonction du Rhône à Marseille, voies navigables et voies ferrées. Par M. J. Charles-Roux.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 324–346.

France—Currency. ———

La Monnaie de Paris à l'Exposition Universelle de 1900. Paris: Imp. Nationale, 1900. Size 7½ × 4½, pp. 84. *Presented by M. Auguste Arnauné.*

An account of the currency and coinage of France in connection with the exhibit by the Paris Mint at the Paris Exhibition.

France—Gard. *La G., B.S.G. Paris* (1900): 365–384. **Martel.**

Padirac. Étude d'hydrologie souterraine. Par M. E. A. Martel. *With Plan and Illustrations.*

France—Loire. **Doby.**

La navigabilité de la Loire, état de la question. Par M. V. Doby.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 291–300.

France—Marseilles. **Estrine.**

Un port franc à Marseille, les enseignements de l'Histoire et les desiderata actuels, Par M. Lucien Estrine.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 309–324.

France—Marseilles. **Masson.**

Marseille port colonial. Par M. Paul Masson.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 349–373.

France—Mont Blanc. *Rev. Scientifique* **13** (1900): 715–720. **Vallot.**

Un projet de chemin de fer du pied au sommet du Mont-Blanc, d'après MM. J. et H. Vallot.

Plan of an underground, electric, cog-wheel railway from Chamonix to a point about 800 feet below the summit of Mont Blanc.

France—Nice. **Harris.**
Trade of Nice and District for the year 1899. Foreign Office, Annual No. 2435, 1900. Size 10 × 6, pp. 14. *Price* 1*d.*

France—Paris. **Baedeker.**
Paris and environs with Routes from London to Paris. Handbook for travellers by Karl Baedeker. With 12 Maps and 36 Plans. Fourteenth Revised Edition. Leipsic: Karl Baedeker; London: Dulau & Co. 1900. Size 6½ × 4½, pp. lvi. and 420. *Price* 6 *m. Presented by Messrs. Dulau & Co.*

France—Wind. **Hautreux.**
Les vents dans les golfes du Lion et de Gascogne. Par M. Hautreux.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 300–308. *Diagram.*

On the nature and seasonal variations of the winds on the south and west coasts of France.

France—Wrecks. *Rev. Maritime* **145** (1900): 291–311. ———
Rapport sur la Statistique des naufrages pour l'année 1896. *With Chart.*

On the wrecks occurring on the coast of France, with a chart showing the position of each wreck, the name of the vessel, and an indication as to whether the ship was saved or lost.

Germany. *M.V. Erdk. Leipzig* (1899): 1–83. **Haage.**
Die deutsche Nordseeküste in physikalisch-geographischer und morphologischer Hinsicht, nebst einer kartometrischen Bestimmung der deutschen Nordseewatten. Von Reinhold Haage.

An elaborate discussion of the German North Sea coast in its geographical relations, dealing with the definition of a coast, its relations to the land and to the sea, and the changes which it undergoes.

Germany. *Petermanns M.* **46** (1900): 112–116. **Langhans.**
Die wirtschaftlichen Beziehungen der deutschen Küsten zum Meere. Von Paul Langhans. *With Map.*

On the marine industries pursued by the people along the coasts of Germany.

Germany—Hamburg. **Ward.**
Trade of Hamburg and District for the year 1899. Foreign Office, Annual No. 2431, 1900. Size 10 × 6½, pp. 90. *Price* 5*d.*

Germany—Inland Navigation. **Gallouédec.**
A travers le Monde, Tour du Monde **6** (1900): 169–172, 177–180.
La Navigation intérieure en Allemagne. Par M. L. Gallouédec. *With Maps.*

Germany—Prussia. ———
Veröffentlichung des Königl. Preussischen Geodätischen Institutes. Neue Folge No. 1. Die Polhöhe von Potsdam. II. Heft. Berlin: P. Stankiewicz, 1900. Size 11½ × 9, pp. 58. *Plates. Presented by the K. Geodätisches Institut.*

As the outcome of 4390 individual observations, the latitude of the centre of the great dome of the observatory at Potsdam is deduced as 52° 22′ 55″·92.

Greece—Corfu. **Claparède.**
Corfou et les Corfiotes. Par Arthur de Claparède. Genève: H. Kündig; Paris: Librairie Fischbacher. 1900. Size 7½ × 5, pp. x. and 178. *Price* 3 *fr. Presented by the Author.*

M. de Claparède, observing that there is no recent book on Corfu in the French language, has by this graceful little volume endeavoured to fill the gap. He touches on the physical features of the island, summarizes the history, and describes its present condition and the objects of interest it contains.

Iberian Peninsula—History. *O Instituto* **47** (1900): 257–262, 321–327. **Garofalo.**
Contributi alla storia delle provincie occidentali dell' impero Romano. Por Francesco P. Garofalo.

Iceland. *M.V. Erdk. Leipzig* (1899): 85–141. **Schumann.**
Islands Siedelungsgebiete während der landnámatið. Von Oskar Schumann. *With Map.*

Amongst the numerous sources referred to in this study of the anthropogeography of Iceland at an early period we miss the compendious 'Historical Geography of Iceland,' by Th. Thoroddson.

Iceland. *G. Tidskrift* **15** (1900): 93–121. **Thoroddsen.**

Jordskjælv i Islands sydlige Lavland, deres geologiske Forhold og Historie. III. Af Dr. Th. Thoroddsen.

On earthquakes in the southern lowlands of Iceland.

Italy. *Atti R.A. Lincei, Rendiconti* **9** (1900): 329–336. **Giacomelli.**

Sulla latitudine di Monte Mario. Nota di F. Giacomelli.

Italy—Bergamo Alps. **Hoepli.**

Manuali Hoepli. Guida-Itinerario alle Prealpi Bergamasche compresa la Valsassina ed i passi alla Valtellina ed alla Valcamonica, colla prefazione del Prof. A. Taramelli. Terza Edizione. Text and Maps. Milano: Ulrico Hoepli, 1900. Size 6 × 4½, pp. xlviii. and 242. *Maps and Illustrations. Price* 6.50 *lira. Presented by the Publisher.*

An elegant and practical guide-book; the text, illustrated by pictures and a geological map on a small scale, gives all the information any tourist or mountaineer could wish. The maps, in a separate cover, include one of the whole of the Bergamo Alps on the scale of 1 : 100,000, including the data of a number of sheets of the military map, and one printed in four colours on twice the scale (more than 1 inch to the mile) of the central district, showing with exceptional distinctness all the roads divided into four classes, and also the mule-tracks, the ordinary footpaths, and the difficult mountain tracks. The price (less than 5s.) is remarkably low.

Italy—Hydrographic Surveys.

Annali Idrografici, Raccolta di documenti e notizie circa l' Idrografia e la Navigazione, pubblicati per cura dell' Istituto Idrografico della R. Marina. Volume i. Anno 1900. Genova, 1900. Size 11 × 8, pp. 134. *Charts and Diagrams. Presented by the R. Istituto Idrografico.*

Italy—Sardinia. *Atti R.A. Lincei, Rendiconti* **9** (1900): 345–349. **Pampaloni.**

I terreni carboniferi di Seui ed oolitici della Perdaliana in Sardegna. Nota di L. Pampaloni.

On the coal-measures of Sardinia.

Italy—Sicily. *Riv. G. Italiana* **7** (1900): 273–285. **Marinelli.**

Conche lacustri dovute a suberosioni nei gessi in Sicilia. Appunti di Olinto Marinelli. *With Map.*

The map shows the distribution of caves in Sicily.

Norway—Climate. *Videnskabs. Skrifter* (1899) (No. 5): 1–36. **Mohn.**

Klima-Tabeller for Norge. V.—XII. Af H. Mohn.

Norway—Place-Names. *Petermanns M.* **46** (1900): 118–119. **Nielsen.**

Das neueste Werk über die geographische Onomatologie Norwegens. Von Prof. Dr. Yngvar Nielsen.

Pyrenees. **Guénot.**

Les inondations de 1897 et les effets du déboisement des Pyrénées, par M. S. Guénot.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session —Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 274–290.

Brings forward evidence from the Pyrenees of the disastrous results of destroying the forests on mountain slopes in the immediate increase in the frequency and destructiveness of floods.

Pyrenees. *Alpine J.* **20** (1900): 87–102. **Spender.**

The High Pyrenees. By Harold Spender. *With Illustrations.*

Rumania—Historical. *B.S.G. Română* **20** (1899): 41–70. **Jorga.**

Documente geografice, De D. N. Jorga. *With Illustrations.*

Documents relating to historical changes in Rumanian territory. One of the illustrations is the reproduction of a map of the neighbourhood of Jassy in 1788.

Rumania—Transylvanian Alps. *B.S.G. Română* **20** (1899): 83–86. **Martonne.**

Sur la période glaciaire dans les Karpates méridionales. Par M. E. de Martonne.

Rumania—Transylvanian Alps. *B.S.G. Română* **20** (1899): 87–90. **Martonne.**

Sur l'histoire de la vallée du Jiu (Karpates méridionales). Par M. E. de Martonne.

Russia. *National G. Mag.* **11** (1900): 169-184. **Grosvenor.**
The Growth of Russia. By Edwin A. Grosvenor. *With Maps.*

The author is professor of Modern Governments and their Administration in Amherst College, and he treats the growth of Russia from the point of view of its political individuality.

Russia—Crimea. *Contemporary Rev.* **78** (1900): 38–57. **Norman.**
In the Haunted Crimea. By Ménie Muriel Norman.

A visit to sites of historic interest in the Crimea.

Russia—Finland. *Bidrag Finlands Natur o. Folk* **58** (1900): 1–45. **Kihlman.**
Pflanzen phänologische Beobachtungen in Finland 1895. Zusammengestellt von A. Osw. Kihlman.

On the dates of the budding, flowering, ripening, etc., of plants in different parts of Finland.

Russia—Finland. *Bidrag Finlands Natur o. Folk* **58** (1900): 73–110. **Lagerborg.**
Finland i utländsk historisk literatur. Bibliografiska meddelanden af Rolf Lagerborg.

A bibliography of works appearing on Finland in foreign languages.

Russia—Finland. *Bidrag Finlands Natur o. Folk* **58** (1900): 47–72. **Stenroos.**
Thierphänologische Beobachtungen in Finland 1895. Zusammengestellt von K. E. Stenroos.

On the dates of the arrival, breeding, and departure of migratory birds and other animals.

Russia—Finland. *Bidrag Finlands Natur o. Folk* **58** (1900): 275–346. **Wiik.**
Om de primitiva formationernas geologi med särskild hänsyn till Finlands geologiska förhållanden. (*Résumé.*) Af F. J. Wiik.

On the primitive geological formations in Finland.

Russia—Finland. *Bidrag Finlands Natur o. Folk* **58** (1900): 111-274. **Westerlund.**
Självmorden i Finland 1861–1895. Statistisk sammanställning af F. W. Westerlund. *With Map and Diagrams.*

Statistics of suicide in different parts of Finland and at different periods of the century.

Russia—New Russia. *Rev. G.* **46** (1900): 321–335, 401-415. **Baye.**
En Nouvelle Russie. Souvenirs d'une mission. Par le Baron de Baye. *With Illustrations.*

Russia—Poland. **Murray and Kimens.**
Trade of Poland and Lithuania for the Year 1899. Foreign Office, Annual No. 2425, 1900. Size 10 × 6, pp. 40. *Price* 2½*d.*

The Consuls say, "The unbroken failure of British merchants to compete with other countries in the supply of the Russian market may be put down to two causes—ignorance and obstinacy."

Spain. **Various Authors.**
L'Espagne, politique, litterature, armée et marine, justice, enseignement, économie, finances, ethnographie, colonies, beaux-arts, la cour, la société, etc. Numéro spécial encyclopédique de la Nouvelle Revue Internationale. Préface: La Patrie Espagnole, par Madame Rattazzi. Quatrième édition. Paris: Librairie Nilsson, 1900. Size 10½ × 6½, pp. 248. *Illustrations. Price* 7.50 *fr. Presented by the Publisher.*

Sweden—Gothenburg.
Göteborgs Turistförenings Årsskrift för åren 1899 och 1900. Göteborg, 1900. Size 8½ × 6½, pp. 114. *Map and Illustrations. Price* 1.50 *kr. Presented by the Gothenburg Tourist Association.*

United Kingdom—England. **Baddeley.**
Thorough Guide Series. The English Lake District. By M. J. B. Baddeley, B.A. With 18 Maps, Panoramas, etc. (Corrected up to date from the Ordnance Survey.) By Bartholomew. Eighth edition. London: Dulau & Co., 1899. Size 6½ × 4¼, pp. xxx., 248, and 18. *Price* 5*s. net. Presented by the Publishers.*

This edition has been enlarged and rendered more complete than ever.

United Kingdom—England. *Brit. Assoc. Rep.* (1899): 479–488. **Coode and Matthews.**
Dover Harbour Works. By J. C. Coode and W. Matthews. *With Plan.*

On the plan of the great national harbour of refuge now being built at Dover.

United Kingdom—England. **Nares.**

Report on the Present State of the Navigation of the River Mersey (1899), to the Right Honourable the Commissioners for the Conservancy of the River Mersey. By Vice-Admiral Sir G. S. Nares, K.C.B., F.R.S. London, 1900. Size 10 × 6½, pp. 20. *Presented by the Mersey Conservancy.*

United Kingdom—Geological Photographs. *Brit. Assoc. Rep.* (1899): 377–397. ——

Photographs of Geological Interest in the United Kingdom. Tenth Report of the Committee.

United Kingdom—Imports and Exports. *Contemporary Rev.* 77 (1900): 716–727. **Mulhall.**

Imports and Exports of 40 Years. By M. G. Mulhall.

A statistical paper comparing the weight and value, both as total sums and per head of the population, of certain selected imports and exports at intervals of ten years between 1859 and 1899.

United Kingdom—Meteorology. *J. Scottish Meteorolog. S.* 11 (1900): 290–298. **Mossman.**

Barometric and Thermometric Gradients between London and Edinburgh, 1764–1898. By R. C. Mossman. *With Diagrams.*

For the years 1764–1898 the mean annual temperature of London was 50°·2, and of Edinburgh 46°·8, a difference of 3°·4; the average temperature in Edinburgh was 5°·4 lower than that of London in August, but only 0°·8 in January. The mean pressure at sea-level and 32° for the period 1774–1898 was 29·952 inches in London, and 29·855 in Edinburgh, a difference of 0·097 inch, the difference being greatest in February and least in May.

United Kingdom—Ordnance Survey. **Farquharson.**

Twelve Years' Work of the Ordnance Survey, 1887 to 1899. By Colonel Sir John Farquharson, K.C.B. (From the *Geographical Journal* for June, 1900.) Size 10 × 6½, pp. 34. *Diagrams.*

United Kingdom—Scotland. **Baddeley.**

Thorough Guide Series. Scotland (Part i.): Edinburgh, Glasgow, and the Highlands as far north as Aberdeen, Inverness, Gairloch, and Stornoway, with a description of the various approaches by land and sea from the south. By M. J. B. Baddeley, B.A. Forty-nine Maps and Plans by Bartholomew. Ninth Edition. London: Dulau & Co., 1900. Size 6½ × 4½, pp. xxxii. and 346. *Price* 6*s.* 6*d. net. Presented by the Publishers.*

Enlarged and improved, with admirable orographical maps, the colouring of which, however, has the defect of inverting the usual convention of using dark green for low ground and merging into brown through light green.

United Kingdom—Scotland. **Baddeley.**

Thorough Guide Series. Orkney and Shetland, with approaches from Edinburgh, Aberdeen, Thurso, and the Western Highlands. By M. J. B. Baddeley, B.A. Ten Maps by Bartholomew. Fourth edition. London: Dulau & Co., 1900. Size 7 × 5, pp. viii. and 64. *Price* [*paper covers*] 1*s. net. Presented by the Publishers.*

United Kingdom—Scotland—Rainfall. **Buchan.**

J. Scottish Meteorolog. S. 11 (1900): 251–283.

The Annual Rainfall of Scotland from 1800 to 1898. By Dr. Alexander Buchan.

Tables are given showing the total rainfall in inches for each year from 1800 to 1840 for 23 stations, and for each year from 1840 to 1898 for 298 stations in Scotland, the greater number of which, however, only give records from 1860 onwards. Another table gives for each station the number of years observed, the average rainfall, and the dates and corresponding readings of the wettest and driest years and the three driest consecutive years.

United Kingdom—Wales. *Geolog. Mag.* 7 (1900): 204–215, 241–245. **Lake.**

Bala Lake and the River System of North Wales. By Philip Lake. *With Maps and Sections.*

An abstract with discussion is given in the *Q.J. Geological S.* 56 (1900): 230–232.

Western Europe—Sailing Directions. ——

Sailing Directions for the West Coasts of France, Spain, and Portugal from Ushant to Gibraltar, including Gibraltar Strait, and the African Coast from Ceuta to Mogador. Sixth Edition, 1900. London: J. D. Potter, 1900. Size 9½ × 6, pp. xxviii. and 648. *Index Chart. Price* 4*s. Presented by the Admiralty.*

Western Europe—Rhine. **Baedeker.**

The Rhine from Rotterdam to Constance. Handbook for Travellers by Karl Baedeker. With 45 Maps and 25 Plans. Fourteenth Revised Edition. Leipsic: Karl Baedeker; London: Dulau & Co., 1900. Size 6½ × 4½, pp. xxxiv. and 448. *Price 7m. Presented by Messrs. Dulau & Co.*

ASIA.

Chinese Turkestan. *Meteorolog. Z.* **17** (1900): 193–202. **Woeikof.**

Klima von Luktschun, Centralasien. Von A. Woeikof.

On the peculiar climatic conditions of this remarkable depression in the Turfan oasis.

Dutch East Indies. **Kan.**

Les études scientifiques concernant les possessions Néerlandaises aux Indes Orientales 1883–1900. Par C. M. Kan. (Exposition Universelle à Paris 1900. Extrait du Guide à travers la Section des Indes Néerlandaises, Groupe xvii.) Size 8½ × 6, pp. 14. *Presented by the Author.*

This deals with the scientific studies carried out in the Dutch East Indies between 1883 and 1900.

India. *J.S. Arts* **48** (1900): 569–585. **Baines.**

The Industrial Development of India. By J. A. Baines.

An important discussion on the future of industrial occupations in India.

India—Assam. ———

Returns of the Rail and River-borne Trade of the Province of Assam for the quarter ending September 30, 1899. Shillong, 1899. Size 13½ × 8½, pp. 118.

India—Assam. **Basu.**

Note on the Lac Industry of Assam. By B. C. Basu. (Agricultural Department, Assam. Bulletin No. 6. Industrial Series No. 1.) Shillong, 1900. Size 10 × 6½, pp. 14.

India—Burma. *P.R. Artillery J.* **27** (1900): 65–74. ———

The Arracan Expedition, 1825. From the diary of an artillery officer. *With Map.*

India—Burma. **Ferrars.**

Burma. By Max and Bertha Ferrars. London: Low & Co., 1900. Size 11½ × 9, pp. xii. and 238. *Map and Illustrations. Price 30s. net. Presented by the Publishers.*

A strikingly artistic book in binding and illustrations, this volume deals with the life of the Burmese people from birth to death, every stage in the narrative being illustrated by photographs, the total number of which mounts up to 455. A few short appendices summarize some more technical matters. The book is something quite unusual, and gives a very realistic impression of native life; it is greatly to the credit of the artist that not one of the pictures contains the representation of a European: the subject dealt with is Burmese Burma.

India—Historical. **King.**

Indian Antiquary **28** (1899): 119, 141, 180, 209, 235, 277, 305; **29** (1900): 4.

History of the Bahmani Dynasty. By Major J. S. King. *With Map.*

The map shows the political divisions of the Dakhan (Deccan) as it was in 1565.

India—Historical. *Ann. G.* **9** (1900): 251–257. **Malavialle.**

La carte de l'Inde d'après Pomponius Mela. Par L. Malavialle. *With Map.*

A criticism of the attempts made by various authorities to give cartographic expression to the description of India in the Chorographia of Pomponius Mela, together with the author's rendering.

India—Kashmir. *Q.J. Geolog. S.* **56** (1900): 337–369. **McMahon.**

Notes on the Geology of Gilgit. By Lieut.-Gen. C. A. McMahon. *With Plate.*

India—Kashmir. *Alpine J.* **20** (1900): 122–127. **Neve.**

The Ascent of Haramouk. By Dr. Ernest F. Neve. *With Illustrations.*

India—Madras Observations. **Smith.**

Results of Observations of the Fixed Stars made with the Madras Meridian Circle, under the direction of the late Norman Robert Pogson. By C. Michie Smith, B.SC. Vol. ix. General Catalogue. Madras, 1899. Size 12½ × 10, pp. xxviii. and 314. *Presented by the Madras Observatory.*

India—Water-supply. *Blackwood's Mag.* **167** (1900): 658–665. ——

Value of the Water of the Great Rivers of India.

Enforcing the vital value of water in Indian agriculture.

India and Persia. *P.R. Artillery I.* **27** (1900): 115–120. ——

The Western Glacis of India. *With Map.*

A recent journey by a British officer from Quetta through Baluchistan to Sistan, and thence northward to Duruksh, in Persia.

Korea. *Imp. and Asiatic Quarterly Rev.* **10** (1900): 154–167. **Salwey.**

Korea, the Pearl of the Orient: Traditional, Historical, Descriptive. By Charlotte M. Salwey.

Malay Archipelago. ——

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 304–310.

De Siboga-Expeditie.

On the proceedings of the *Siboga* deep-sea expedition in the waters of the Malay archipelago from September 28, 1899, to January 2, 1900.

Malay Archipelago. **Wichmann.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 226–233.

De Doif-eilanden (Jef Doif) door Arthur Wichmann. *With Map.*

On the controversy as to the existence of the Doif islands between Gilolo and New Guinea.

Malay Archipelago—Borneo. **Nieuwenhuis.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 177–204.

Tweede reis van Pontianak naar Samarinda in 1898 en 1899. Door Dr. A. W. Nieuwenhuis. *With Illustrations.*

Malay Archipelago—Sumatra. **Pleyte.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 205–225.

Herinneringen uit oost-Indië. Door C. M. Pleyte. *With Illustration.*

A journey from Padang to Kota Baroe *viâ* Sawah-Loentoh.

Russia—Bokhara. *Scottish G. Mag.* **16** (1900): 357–368. **Rickmers.**

Bokhara. By W. R. Rickmers. *With Illustrations.*

Russia—Caucasus. **Radde.**

Die Sammlungen des Kaukasischen Museums, im Vereine mit Special-Gelehrten bearbeitet, und herausgegeben von Dr. Gustav Radde. Band i. Zoologie. Von Dr. Gustav Radde. Tiflis, 1899. Size 12½ × 9, pp. 520. *Portrait, Maps, and Plates.* [In Russian.] *Presented by Dr. Radde.*

A catalogue of the zoological collections in the Tiflis Museum, with numerous photographs of the specimens, and maps showing their distribution.

Russia—Caucasus. **Stevens.**

Trade of Batoum and District for the year 1899. Foreign Office, Annual No. 2424, 1900. Size 10 × 6, pp. 24. *Price* 1½*d.*

The congestion of the Baku-Batum railway has led to a rapid increase in the importance of Novorossisk as a place of export for oil from Baku, which was sent by tank-steamer on the Caspian to Petrovsk, and thence by the railway north of the Caucasus to the Black Sea port.

Russia—Railways. **Gourdet.**

Le chemin de fer en Asie Centrale: Jonction du Transcaspien avec le Transsibérien. Par M. Paul Gourdet.—Congrès National des Sociétés Françaises de Géographie. XIX.e Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 256–274.

On the proposed line to connect the Siberian railway with the Trans-Caspian.

Russia—Siberia. *Petermanns M.* **46** (1900): 116–118. **Krahmer.**

Bogdanowitsch' Ochotskisch-Kamtschatkasche Bergexpedition 1895-98. Von General Krahmer.

Russian Central Asia. *G. Tidskrift* **15** (1900): 121–149. **Olufsen.**

Den anden danske Pamir-Expedition. Ved Premierløjtnant Olufsen. *With Map and Illustrations.*

Lieut. Olufsen describes his journey down the Amu-darya by boat to Khiva from Charjui.

Turkey—Bussorah. **Wratislaw.**
Trade of Bussorah for the year 1899. Foreign Office, Annual No. 2428, 1900. Size 10 × 6, pp. 10. *Price* 1*d.*

Western Asia. **Oppenheim.**
Vom Mittelmeer zum Persischen Golf, durch den Haurān, die Syrische Wüste und Mesopotamien. Von Dr. Max Freiherrn von Oppenheim. Zweiter Band. Berlin: Dietrich Reimer (Ernst Vohsen), 1900. Size 9½ × 7, pp. xiv. and 434. *Maps and Illustrations. Presented by the Publisher.*

This volume deals with journeys in Mesopotamia and on the shores of the Persian gulf, with much valuable information regarding the Bedawin and a series of maps.

AFRICA.

British West Africa—Ashanti. **Baden-Powell.**
The Downfall of Prempeh. A diary of life with the Native Levy in Ashanti, 1895–96. By Major-General R. S. S. Baden-Powell. London: Methuen & Co., 1900. Size 9 × 6, pp. 126. *Sketch-map and Illustrations. Price* 6*d. Presented by the Publishers.*

Cape Colony—Forests. *T. South African Phil. S.* **11** (1900): 53–66. **Hutchins.**
Cape National Forests. By D. E. Hutchins.

Cape Colony—Kimberley. *T. South African Phil. S.* **11** (1900): 77–112. **Sutton.**
The Winds of Kimberley. By J. R. Sutton. *With Diagrams.*

Cape Colony—Kimberley. *T. South African Phil. S.* **11** (1900): 7–17. **Sutton.**
Do the mining operations affect the climate of Kimberley? By J. R. Sutton.

Experiments are described which were carried out in order to test the effect on climate of covering many square miles of red sandy soil near Kimberley with the blue clay from the diamond-mines. It was found that the air is always warmer above the blue ground than it is above the red sand, and that comparison of the air-temperatures at Kenilworth and Kimberley show that Kimberley, surrounded by the blue ground, was much the warmer from September to March (the summer months), and cooler from April to August. It is pointed out that the trees surrounding Kenilworth may have contributed to this effect.

Central Africa. **Pearce.**
Notes on the Country between Lake Chiuta and the River Luli, Central Africa. By Captain F. B. Pearce. (From the *Geographical Journal* for June, 1900.) Size 10 × 6½, pp. 10. *Map and Illustrations.*

Congo Basin. *Mouvement G.* **17** (1900): 265–267. ———
La région des bas-fonds de l'ancienne mer intérieure du haut Congo. *With Map.*

Congo State. **Bentley.**
Pioneering on the Congo. By the Rev. W. Holman Bentley. 2 vols. London: The Religious Tract Society, 1900. Size 9 × 5½, pp. (vol. i.) 478; (vol. ii.) 448. *Map and Illustrations. Price* 16*s. net. Presented by the Religious Tract Society.*

This tells the story of the growth of the Congo State from the first establishment of missions in 1879 down to the present day, and it is written by almost the last survivor of the pioneers whose labours made the great achievements of recent years possible. There are numerous illustrations and a map showing the position of the mission stations in the Congo basin.

Egypt. **Worsfold.**
The Redemption of Egypt. By W. Basil Worsfold, M.A. London: G. Allen, 1899. Size 10 × 7½, pp. xviii. and 334. *Illustrations. Price* 25*s. net.*

The title refers to the reorganization of Egyptian affairs. The information is the result of a visit to Egypt in 1898–99.

Egypt—Gold Mining. **Alford.**
Egyptian Mines Exploration. A Report on Ancient and Prospective Gold Mining in Egypt. By Charles J. Alford. London: Waterlow & Sons, 1900. Size 10½ × 8½, pp. 40. *Maps, Plans, and Illustrations. Presented by the Author.*

Egypt—Historical. *J. Asiatique* **15** (1900): 80–96, 201–253. **Weill.**
L'art de la fortification dans la haute antiquité égyptienne. Par M. Raymond Weill. *With Plans.*

French Somaliland. *Rev. G.* **46** (1900): 375–379, 456–463. **Barré.**
Djibouti et Obock. Par M. P. Barré.

French West Africa. **Bohn.**
Le développement économique de nos Colonies de l'Afrique occidentale. Par M. Frédéric Bohn.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 399–411.

French West Africa. *B.S.G. Com. Bordeaux* **26** (1900): 229–245. **Hostains.**
De la Côte d'Ivoire au Soudan et à la Guinée française. Par M. Édouard Hostains. *With Map.*

A description of a journey from the Ivory Coast through the country north of Liberia and Sierra Leone to Konak, in French Guinea.

French West Africa—Dahomé. **Borelli.**
Le Dahomé, ressources économiques et avenir commercial. Par M. Georges Borelli.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 412–431.

German East Africa. *M. Deutsch. Schutzgeb.* **13** (1900): 132–143. ——
Die Fortschritte der Pendelexpedition.

German East Africa. **Dundas.**
Trade of German East African Coast Towns for the year 1899. Foreign Office, Annual No. 2373. 1900. Size 10 × 6½, pp. 38. *Price* 2½*d.*

Particulars as to the present state of Tanga, Pangani, Saadani, Bagamoyo, Dar-es-Salaam, Kilwa, Lindi, and Mikindani.

German East Africa. *M. Deutsch. Schutzgeb.* 13 (1900): 144–172. **Kannenberg.**
Reise durch die hamitischen Sprachgebiete um Kondoa. Von Hauptmann Kannenberg. *With Map.*

German East Africa. *M. Deutsch. Schutzgeb.* **13** (1900): 115–126. **Richter.**
Notizen über Lebensweise, Zeitrechnung, Industrie und Handwerk der Bewohner des Bezirks Bukoba. Von Hauptmann Richter.

German East Africa. *M. Deutsch. Schutzgeb.* **13** (1900): 174–183. **Schmitt.**
Geographische Ortsbestimmungen in Ostafrika, Ausgeführt vom Geographen R. H. Schmitt.

German South-West Africa. *M. Deutsch. Schutzgeb.* **13** (1900): 109–114. ——
Resultate der meteorologischen Beobachtungen in Swakopmund im Jahre 1899.

German South-West Africa. *T. South African Phil. S.* **11** (1900): 19–33. **Watermeyer.**
Notes on a Journey in German South-West Africa. By J. C. Watermeyer.

The object of this journey was to study the agricultural and pastoral prospects of the country.

German West Africa—Kamerun. **Stein and Moisel.**
M. Deutsch. Schutzgeb. **13** (1900): 93–108.
Erläuterungen zu meinen Reisen in Süd-Kamerun (1895 bis 1899). Von Oberleutnant Freiherrn v. Stein. *With Map.*

Begleitworte zu der Karte: Aufnahmen des Oberleutnants Freiherrn v. Stein zu Lausnitz im südlichen Kamerungebiet in den Jahren 1895 bis 1899. Von Max Moisel.

German West Africa—Togo. *M. Deutsch. Schutzgeb.* **13** (1900): 91–92. **Cohn.**
Geographische Ortsbestimmungen von Dr. Kersting im Hinterlande von Togo. Berechnet von Dr. Fritz Cohn.

Gold Coast—Northern Territories. **Northcott.**
Report on the Northern Territories of the Gold Coast. Compiled by the late Lieut.-Colonel H. P. Northcott, C.B., from Reports furnished by officers of the Administration. Intelligence Division, War Office. London: Printed by Harrison & Sons, 1899. Size 9½ × 6, pp. 164. *Presented by the War Office.*

Lagos. **Denton.**
Lagos. Report for 1898. Colonial Reports, Annual No. 284, 1899. Size 10 × 6, pp. 20. *Price* 1½*d.*

Madagascar. *C. Rd.* **130** (1900): 1229–1231. **Colin.**
Positions géographiques et observations magnétiques sur la côte orientale de Madagascar. Note du P. Colin.

The position and magnetic constants are given for Vatomandry, Marosika, and Mahanoro. The charts were found to be in error to the extent of 4′ to nearly 5½′ in longitude, and from 1′ to nearly 2½′ in latitude.

Madagascar. *J. Asiatique* **15** (1900): 278–296. **Gautier.**

Les Hova sont-ils des Malais? Essai d'une étude Comparative entre les dialectes Hova et Sakalava. Par M. E. F. Gautier.

The author argues that the evidence of the Malagasy language being related to the Malayo-Polynesian group is absolute, but that the bulk of the people of Madagascar are akin, not to the Malays, but to the Polynesians, and especially to the Papuans.

Madagascar. **Grandidier.**

Voyage de la Reine Ranavalona I^re^ à Manerinerina. Par G. Grandidier. (Extrait de la Revue de Madagascar, numéro du 10 janvier 1900.) Paris, 1900. Size 9½ × 6½, pp. 16. *Presented by the Author.*

Describes a royal progress of the queen of Madagascar in 1845.

Madagascar. **Jumelle.**

Les forêts et les essences forestières exploitables à Madagascar. Par M. Henri Jumelle.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 432–442.

Morocco. **Giraud.**

Itinéraires de Mogador à Marrakech. Par M. Hubert Giraud.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 507–622. *Map.*

Morocco. *La G., B.S.G. Paris* (1900): 437–448. **Weisgerber.**

Études géographiques sur le Maroc. Par le Dr. Weisgerber. *With Map, Plan, and Illustrations.*

Morocco—Casablanca. *Ann. Hydrographie* **28** (1900): 245–247. ——

Casablanca. Bearbeitet nach dem Reisebericht S.M.S. *Charlotte*, etc. *With Plan.*

Morocco—Mogador. *Ann. Hydrographie* **28** (1900): 242–245. ——

Mogador. Bearbeitet nach dem Reisebericht S.M.S. *Charlotte*, etc., erganzt nach englischen Quellen. *With Plan.*

North Central Africa. **Lloyd.**

In Dwarf Land and Cannibal Country. A Record of Travel and Discovery in Central Africa. By A. B. Lloyd. With Introduction by the Rt. Hon. Sir John H. Kennaway, Bart., M.P. London: T. Fisher Unwin, 1900. Size 8½ × 6, pp. xxiv. and 386. *Maps and Illustrations. Price* 6*s. Presented by the Publisher.*

A full, interesting, and well-illustrated record of a journey across Africa through the heart of the equatorial forest-belt. The journey is referred to in the *Journal* for 1899, vol. xiii. p. 195.

Portuguese East Africa. *Mouvement G.* **17** (1900): 277–281. **Levêque.**

Le Zambèse et le Shire. Par M. Levêque. *With Map.*

On the navigability and conditions of travelling on the rivers Zambezi and Shire, with times and fares of the steamers.

Portuguese East Africa—Beira. **McMaster.**

Trade of Beira for the year 1899. Foreign Office, Annual No. 2427, 1900. Size 10 × 6, pp. 18. *Price* 1½*d.*

Portuguese East Africa—Macombe's Country. *J.S. Arts* **48** (1900): 343–351. **Peters.**

Macombe's Country (South of the Zambezi), its Ancient Goldfields and Industrial Resources. By Dr. Carl Peters.

Sahara—Tidikelt. *La G., B.S.G. Paris* (1900): 355–364. **Flamand.**

Mission au Tidikelt, archipel Touatien. Résultats scientifiques généraux. Par M. G. B. M. Flamand. *With Illustrations.*

The author boldly extends the metaphor of the desert as a sea of sand by talking of a group of oases as an archipelago.

Sahara—Tidikelt. *Ann. G.* **9** (1900): 233–242. **Flamand.**

Une mission d'exploration scientifique au Tidikelt. Par G. B. M. Flamand. *With Map.*

The object of this mission was to study the caravan routes and halting-places and the nature of the trade across the Sahara between Algeria and the Sudan.

Sokotra. *Brit. Assoc. Rep.* (1899): 460–464. ——

Exploration of Sokotra. Report of the Committee.

The facts referred to in this report are given in the *Geographical Journal*, vol. xiii. (1899), p. 633.

Somaliland. **Pearce.**

Rambles in Lion Land. Three Months' Leave passed in Somaliland. By Captain Francis B. Pearce. London: Chapman & Hall, 1898. Size 8½ × 6, pp. xii. and 260. *Map and Illustrations. Price* 10*s.* 6*d. Presented by the Author.*

A pleasant narrative of a hunting-trip from Berbera southward to nearly 8° N., the boundary of the Somali protectorate before the cession to Abyssinia in 1897.

Somaliland. *P. Zoolog. S.* (1900): 4–63. **Peel.**

On a Collection of Insects and Arachnids made in 1895 and 1897. By Mr. C. V. A. Peel, in Somaliland, with Descriptions of New Species. *With Plates.*

This article includes a short narrative of Mr. Peel's expeditions in Somaliland in 1895 and 1897.

South Africa. *Tijds. K. Ned. Aard. Genoots. Amsterdam* 17 (1900): 273–301. **Aitton.**

De Oranje Vrijstaat. Eene schets van Land en Volk door D. Aitton.

This article gives a general description of South Africa, though devoting most attention to the country between the Orange and Vaal rivers.

South Africa. *Fortnightly Rev.* 67 (1900): 860–871. **Dicey.**

South African Reconstruction. By Edward Dicey, C.B.

Considers the present conditions of South Africa, especially with regard to the composition of the white population.

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Influence of Geographical Conditions on Military Operations in South Africa. By Major W. A. Simpson. *With Map.*

South Africa—Climate. *J. School G.* 4 (1900): 208–211. **Herbertson.**

The Climate of South Africa. By A. J. Herbertson.

South Africa—Coal. *T. South African Phil. S.* 11 (1900): 67–74. **Dunn.**

Notes on the Dwyka Coal Measures at Vereeniging, Transvaal, etc. By E. J. Dunn, F.G.S. *Map.*

The map shows the outcrop of the Dwyka coal-measures throughout its whole extent in South Africa.

Tunis. **Fallot.**

La situation économique de la Tunisie. Par M. Ernest Fallot.—Congrès National des Sociétés Françaises de Géographie. XIX^e^. Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 465–485. *Diagram.*

Tunis. **Vassel.**

Le lac de Bou-Grara et la pénétration. Par M. E. Vassel.—Congrès National des Sociétés Françaises de Géographie. XIX^e^. Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 485–489. *Map.*

Uganda Railway. ——

Africa. No. 4 (1900). Memoranda relating to Uganda Railway, 1900. London: Eyre & Spottiswoode. Size 13 × 8½, pp. 10. *Price* 1½*d.*

NORTH AMERICA.

Canada—Ornithology. **Macoun.**

Geological Survey of Canada. Catalogue of Canadian Birds. Part i. Water Birds, Gallinaceous Birds, and Pigeons. By John Macoun. Ottawa, 1900. Size 10 × 6½, pp. viii. and 218. *Presented by the Geological Survey of Canada.*

Canada—Yukon District. **McConnell.**

Geological Survey of Canada. Preliminary Report on the Klondike Gold Fields, Yukon District, Canada. By R. G. McConnell, B.A. Ottawa, 1900. Size 10 × 7, pp. 44. *Map and Illustrations. Presented by the Geological Survey of Canada.*

An official account of the Yukon gold-fields, published in advance of the next report of the Canadian Geological Survey.

Canada—Yukon River. *Scottish G. Mag.* 16 (1900): 321–341. **Tyrrell.**

The Basin of the Yukon River in Canada. By J. B. Tyrrell. *With Map and Illustrations.*

Canada—Yukon Territory. *National G. Mag.* **11** (1900): 199–201. **Hayes and Brooks.**
Ice Cliffs on White River, Yukon Territory. By C. Willard Hayes and Alfred H. Brooks.

This is a severe criticism of the conclusions put forward by Mr. M. W. Gorman in the same magazine for March, 1900.

Mexico. *Scottish G. Mag.* **16** (1900): 342–352. **Howarth.**
The Cordillera of Mexico and its Inhabitants. By O. H. Howarth. *With Illustrations.*

Mexico—Lower California. *Ann. G.* **9** (1900): 243–250. **Diguet.**
La Basse-Californie d'après M. Léon Diguet. *With Illustrations.*

North America—Western. **Petitot.**
Du Territoire d'Alberta à l'État d'Iowa par le Far-West. Par M. l'Abbé Émile Petitot.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session —Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 135–153.

Rocky Mountain Region. *P. American A. Arts and Sci.* **35** (1900): 345–373. **Davis.**
The Freshwater Tertiary Formations of the Rocky Mountain Region. By W. M. Davis.

United States—Chattanooga District. **Hayes.**
Physiography of the Chattanooga district, in Tennesse, Georgia, and Alabama. By C. W. Hayes.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part ii. Pp. 1–58. *Maps.* Washington, 1899.

United States—Indian Territory. **Taff, White, and Girty.**
Geology of the McAlester-Lehigh Coal-field, Indian Territory, by Joseph A. Taff, accompanied by a Report on the Fossil Plants by David White, and a Report on the Palæozoic Invertebrate Fossils, by G. H. Girty.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iii. Pp. 423–593. *Plates.* Washington, 1899.

United States—Michigan. **Clements, Smyth, Bayley, Van Hise.**
The Crystal Falls Iron-bearing District of Michigan. By J. M. Clements and H. L. Smyth. With a chapter on the Sturgeon River Tongue, by W. S. Bayley, and an Introduction by C. R. Van Hise.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iii. Pp. 1–151. *Maps and Illustrations.* Washington, 1899.

United States—Michigan. *American J. Sci.* **9** (1900): 434–438. **Lane.**
The Geothermal Gradient in Michigan. By Alfred C. Lane.

Observations on the temperature in deep artesian wells.

United States—Nebraska. **Darton.**
Preliminary Report on the Geology and Water Resources of Nebraska West of the One Hundred and Third Meridian. By N. H. Darton.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iv. Pp. 719–785. *Maps and Illustrations.* Washington, 1899.

United States—New York and Vermont. **Dale.**
The Slate Belt of Eastern New York and Western Vermont. By T. N. Dale.—Nineteenth Annual of the U.S. Geological Survey, 1897-98. Part iii. Pp. 153–307. *Maps and Plates.* Washington, 1899.

United States—Ohio. **Orton.**
The Rock Waters of Ohio. By E. Orton.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iv. Pp. 633–717. *Illustrations.* Washington, 1899.

On the water-bearing rocks of Ohio.

United States—Oregon. **Diller.**
The Coos Bay Coal-field, Oregon. By J. S. Diller.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iii. Pp. 309–376. *Maps and Illustrations.* Washington, 1899.

United States—Pennsylvania. **Powell.**
Trade of Philadelphia for the year 1899. Foreign Office, Annual No. 2433, 1900. Size 9¼ × 6, pp. 30. *Price* 2*d.*

United States—Stream Measurements. **Newell and others.**

Report of progress of stream measurements for the calendar year 1897, including papers by Dwight Porter, J. B. Lippincott, and other Hydrographers. By F. H. Newell.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iv. Pp. 1-632. *Maps and Illustrations.* Washington, 1899.

United States—Utah. **Tower and Smith.**

Geology and Mining Industry of the Tintic district, Utah. By G. W. Tower, jun., and G. O. Smith.—Nineteenth Annual Report of the U.S. Geological Survey, 1897-98. Part iii. Pp. 601-767. *Plates.* Washington, 1899.

CENTRAL AND SOUTH AMERICA.

Brazil. **Pio di Savoja.**

Gli Italiani nel sud dello Stato di S^ta^ Caterina. Rapporto del cav. Gherardo (dei principi) Pio di Savoja.—Bollettino del Ministero degli Affari Esteri. April, 1900. Roma, 1900. Size 9½ × 6½, pp. 16.

On the condition of the Italian "colonies" in Southern Brazil.

Chile. *Z. Ges. Erdk. Berlin* **35** (1900): 1-76. **Krüger.**

Die chilenische Reñihué-Expedition. Ein Beitrag zur Erforschung der Patagonischen Anden. Von Dr. Paul Krüger. *With Map.*

Description of an expedition up the Rio Reñihué and across the Andes region to the Rio Futaleufu in 1896-97.

Dutch West Indies. **Kan.**

Les colonies Néerlandaises dans les Indes Occidentales. Par C. M. Kan. (Exposition Universelle à Paris 1900. Extrait du Guide à travers la Section des Indes Néerlandaises) (Group xvii.). Size 8½ × 6, pp. 18. *Presented by the Author.*

Guatemala and Mexico—Yucatan. **Maudslay.**

Biologia Centrali-Americana. Edited by F. Ducane Godman. Archæology. By A. P. Maudslay. Part xii. (Plates), January, 1900 (Vol. ii., Plates xxv.–xlix.); Ditto, Part xiii. (Text and Plates), April, 1900 (Vol. iii., pp. 25–43, Plates xxvi.–li.). London: R. H. Porter and Dulau & Co. Size (Text) 13 × 10½, (Plates) 13½ × 20½.

Jamaica.

Further Correspondence relating to the Finances and Government of the Island of Jamaica. London: Eyre & Spottiswoode, 1900. Size 13 × 8½, pp. 50. *Price* 5½*d.*

Paraguay. **Gosling.**

Trade of Paraguay for the year 1899. Foreign Office, Annual No. 2426, 1900. Size 10 × 6, pp. 12. *Price* 1*d.*

This report passes in review the resources of Paraguay, the population of which is now said to be 550,000.

Patagonia. *Tour du Monde* **6** (1900): 193, 205, 217, 229, 241, 253. **La Vaulx.**

Voyage en Patagonie. Par M. le Comte Henry de La Vaulx. *With Map and Illustrations.*

A finely illustrated account of a recent journey in Patagonia, the pictures referring mainly to the natives and their modes of life.

Patagonia—Andes. *Verh. Ges. Erdk. Berlin* **27** (1900): 194–220. **Steffen.**

Herr Prof. Dr. Hans Steffen: Reisen in den Patagonischen Anden. *With Maps.*

South America. *Petermanns M.* **46** (1900): 121–142. **Sievers.**

Die geographische Erforschung Südamerikas im 19 Jahrhundert. Von W. Sievers. *With Maps.*

AUSTRALASIA AND PACIFIC ISLANDS.

Hawaii. **Twombly.**

Hawaii and its People. The Land of Rainbow and Palm. By Alexander S. Twombly. New York, Boston, Chicago: Silver, Burdett & Co.; London: Gay & Bird, 1900. Size 7½ × 5, pp. 384. *Map and Illustrations. Price* 5*s. Presented by Messrs. Gay & Bird.*

A history of Hawaii for young readers, derived from the original sources. The author resided for a year in the islands, and so acquired a personal knowledge of the native character which enables him to give an air of actuality to the compilation.

Mapia Islands. *A travers le Monde, Tour du Monde* **6** (1900): 189 190. ——
Les îles Mapia. *With Map.*

History of these islands off New Guinea which are claimed by Germany as attached to the Carolines.

New Caledonia. *Rev. Française* **25** (1900): 321–330. **Sainte-Marie.**
La colonisation en Nouvelle-Calédonie. Par M. L. de Sainte-Marie.

South Australia—Aborigines. *P. American Philosoph. S.* **39** (1900): 78–93. **Mathews.**
Divisions of the South Australian Aborigines. By R. H. Mathews. *With Map.*

Torres Straits. *Brit. Assoc. Rep.* (1899): 585–592. ——
The Anthropology and Natural History of Torres Straits. Report of the Committee.

The important part of this report is the appendix containing six short papers by Dr. Haddon and the members of his expedition.

Western Australia. *P. American Philosoph. S.* **39** (1900): 123–125. **Mathews.**
Native Tribes of Western Australia. By R. H. Mathews.

POLAR REGIONS.

Arctic—Bering Sea. **Page.**
No. 116. [U.S.] Hydrographic Office. Ice and Ice Movements in Bering Sea during the Spring Months. By James Page. Washington, 1900. Size 9½ × 6, pp. 20. *Map. Presented by the U.S. Hydrographic Office.*

This is noted in the *Journal* for July, vol. xvi. p. 110.

Greenland. **Kornerup.**
Aperçu des "Meddelelser om Grönland" (Communications sur le Grönland) 1876–1899, par la Commission dirigeant les recherches géologiques et géographiques du Grönland, rédigé par Thorvald Kornerup, traduit par Euch. Baruël. Copenhague: C. A. Reitzel, 1900. Size 9½ × 6½, pp. 62. *Map. Presented by the Author.*

Spitsbergen. **Conway**
Some Unpublished Spitsbergen MSS. By Sir Martin Conway. (From the *Geographical Journal* for June, 1900.) Size 10 × 6½, pp. 8. *Illustrations.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geology—Age of Earth. *Geolog. Mag.* **7** (1900): 220–225. **Joly.**
The Geological Age of the Earth. By J. Joly.

On the bearing of the argument from the solution of rocks and the salinity of the ocean on the estimation of the age of the Earth.

Geomorphology. *La G., B.S.G. Paris* (1900): 429–436. **Lapparent.**
L'œuvre de M. Suess. Par A. de Lapparent.

A review of Prof. Suess' great work, 'Das Antlitz der Erde,' in its French translation.

Geomorphology. *Z. Deutsch. u. Österreich. Alpenv.* **30** (1899): 18–27. **Richter.**
Gebirgshebung und Thalbildung. Von E. Richter. *With Illustration.*

A popular account of the origin of mountain scenery, illustrated by the special case of the district surrounding the Gross Venediger.

Geophysics. *C. Rd.* **130** (1900): 1652–1658. **Boussinesq.**
Problème du refroidissement de la croûte terrestre, traité au même point de vue que l'a fait Fourier, mais par une méthode d'intégration beaucoup plus simple. Note de M. J. Boussinesq.

Glacial phenomena. **Balch.**
Glacières or Freezing Caverns. By Edwin Swift Balch. Philadelphia: Allen, Lane, & Scott, 1900. Size 10 × 6½, pp. 338. *Illustrations. Presented by the Author.*

This is a monograph on a special subject—glacières or caverns containing ice. It is divided into an account of experiences in exploring such caverns in different parts of the world, a discussion of the cause of subterranean ice, a list of known glacières, a collection of opinions regarding them collected from many authors, and a bibliography of the subject.

Ground Water. **King.**
Principles and conditions of the movements of ground water. By F. H. King. Nineteenth Annual Report of the U.S. Geological Survey, 1897–98. Part ii. pp. 59–294. *Plates.* Washington, 1899.

Ground Waters. **Slichter.**
Theoretical Investigation of the Motion of Ground Waters. By C. S. Slichter. Nineteenth Annual Report of the U.S. Geological Survey, 1897–98. Part ii. Pp. 295–384. *Illustrations.* Washington, 1899.

Meteorology. *Petermanns M.* **46** (1900): 97–112. **Hergesell.**
Die Temperatur der freien Atmosphäre. Von Prof. Dr. H. Hergesell. *With Diagrams.*

Meteorology—Observations. *Z. Deutsch. u. Österreich. Alpenv.* **30** (1899): 28–42. **Erk.**
Die wichtigsten Bergobservatorien. Von Fritz Erk.
On high-level mountain observatories.

Meteorology—Pressure. *Meteorolog. Z.* **17** (1900): 207–208. **Woeikof.**
Wo ist der höchste Luftdruck der Erde, mit und ohne Reduktion auf das Meeresniveau? Von A. Woeikof.
The highest barometer-reading ever recorded when reduced to sea-level was 808·7 mm. (31·84 inches) at Bernaul, in the government of Tomsk, in January, 1900, the unreduced height being 789·2 mm. (31·07 inches). The highest unreduced reading ever likely to be recorded would be in the Dead sea depression, where a sea-level pressure equal to that at Bernaul would read about 812 mm. (31·97 inches).

Ocean Currents. **Russell.**
Current Papers, No. 4. By H. C. Russell. [Read before the Royal Society of N.S. Wales, October 4, 1899.] Size 8½ × 5½, pp. [10]. *Charts.*
Particulars are given of the course of a number of drift-bottles in the Southern ocean and round the coast of Australia.

Oceanography. ———
The Danish Ingolf-Expedition. Vol. i., Part ii. Contents:—(3) O. B. Boeggild: The Deposits of the Sea-bottom; (4) C. F. Wandel: Current-bottles. Published at the cost of the Government by the direction of the Zoological Museum of the University. Copenhagen: H. Hagerup, 1900. Size 13½ × 10½, pp. 90 and 6. *Charts.*

Oceanography. *Brit. Assoc. Rep.* (1899): 789–802. **Murray.**
Section E.—Geography. Presidential Address. By Sir John Murray, K.C.B., etc.
This address is reprinted in the *Geographical Journal*, vol. xiv. (1899) 426–441.

Oceanography—Apparatus. *Rev. Maritime* **145** (1900): 536–446. **Buchet.**
Planktonmètre pour pêches pélagiques à grande vitesse. Par G. Buchet.
On an apparatus for measuring the quantity of Plankton in sea-water from a ship proceeding at full speed.

Oceanography—Tides. *Nautical Mag.* **69** (1900): 339–357. **Plumstead.**
Mr. Moxly's Appeal to the Gentiles. By E. Plumstead.
A criticism of Mr. Moxly's theory of the tides as set forth in his book noticed in the *Journal*, vol. xiv. (1899), p. 123.

Phytogeography. *Naturw. Wochenschrift* **15** (1900): 217–220. **Dietel.**
Einiges über die geographische Verbreitung der Rostpilze. Von Dr. P. Dietel.
On the geographical distribution of the fungus which produces rust in grain.

Phytogeography. *G.Z.* **6** (1900): 312–325. **Schimper.**
Bericht über die Fortschritte der Pflanzen-geographie in den Jahren 1896 bis 1898. Von A. F. W. Schimper.

River-regulation. *Z. Deutsch. u. Österreich. Alpenv.* **30** (1899): 110–132. **Strele.**
Die Wildbäche und ihre Verbauung. Von G. Strele. *With Illustrations.*
On mountain torrents and the means of regulating their courses so as to avoid floods.

Seismology. *Brit. Assoc. Rep.* (1899): 161–238. ———
Seismological Investigations. Fourth Report of the Committee.

Speleology. **Martel.**
La Spéléologie ou Science des Cavernes. Par E.-A. Martel. (Paris: G. Carré et C. Naud, 1900.) Size 8 × 5½, pp. 126. *Plans. Price* 2 *fr. Presented by the Publishers.*
A compact and systematic little treatise on speleology, or the science of caverns, by the leading French investigator and exponent.

Terrestrial Magnetism. **Lemström.**

Öfversigt Finska Vet.-S. Förhandlingar **41** (1898-99): 60-104.

On the earth-currents and the electrical currents in the atmosphere and their relations to the earth-magnetism. Luminous phenomena, natural and artificial, of the nature of the polar light. By Selim Lemström. *With Maps and Illustrations.*

A comprehensive treatise on terrestrial magnetism, and electric currents in and surrounding the Earth.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Geographical Discovery. *Rev. G. Italiana* **7** (1900): 254-272. **Porena.**

Le scoperte geografiche del secolo XIX. del Prof. Filippo Porena.

Historical. **Beazley.**

New Light on some Mediæval Maps (II. and III.). By C. Raymond Beazley, M.A. (From the *Geographical Journal* for February and April, 1900.) Size 10 × 6½, pp. (ii.) 12; (iii.) 12. *Illustrations.*

Historical—Gonneville. **Gaffarel.**

Le capitaine Paulmier de Gonneville, et le premier voyage des Français au Brésil. Par M. Paul Gaffarel.—Congrès National des Sociétés Françaises de Géographie. XIX^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 154-173.

Describes and discusses the voyage of de Gonneville to Brazil in 1503.

Maritime People. **Schwerin.**

Om Kustfolks olika sjöduglighet. Af H. H. von Schwerin. Lund, 1900. Size 11½ × 9, pp. 104. *Presented by the Author.*

On coast-dwellers of unequal devotion to sea-faring, considered in connection with the physical nature of the country they inhabit.

Medical Geography. *B.S.G. Română* **20** (1899): 15-38. **Stefănescu.**

Paludismul din punct de vedere geografic. De D. Dr. J. Stefănescu. *With Maps.*

On the distribution of malaria, with maps showing the relative frequency of occurrence of cases in Rumania, Europe, and the world.

GENERAL

Bibliography. *P.R.S. Queensland* **15** (1900): 75-81. **Shirley.**

A Reply to "Some Critical Notes on the Queensland Volume of the International Catalogue of Scientific Literature." By John Shirley, B.SC.

This states the other side of the case referred to in vol. XV. (1900), p. 447.

Bibliography—Geology. ———

Geological Literature added to the Geological Society's Library during the Year ended December 31, 1899. London: Geological Society, 1900. Size 9 × 5½, pp. 176. *Price 2s. Presented by the Geological Society.*

British Empire. *Imp. and Asiatic Quarterly Rev.* **10** (1900): 87-100. **Roe.**

The Constitutional Relations of England and her Dependencies. By Sir Charles Roe.

Dutch Colonies. ———

Exposition Universelle Internationale de 1900 à Paris. Guide à travers la section des Indes Néerlandaises. Groupe XVII. (Colonisation). La Haye, 1900. Size 9 × 6, pp. XX. and 454. *Maps. Presented by Prof. Dr. C. M. Kan.*

In this guide there are included not only catalogues of the exhibits of the Dutch East Indies, but also an explanation of the reasons which led to the planning of the exhibit as a whole, the intention being to present as complete a picture as possible of the Dutch possessions in the Far East.

Education. **Vincent**

Réforme de l'Enseignement de la Géographie. Par M. le Dr. J. Vincent.—Congrès National des Sociétés Françaises de Géographie. XIX.^e^ Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 203-214.

Suggests increased attention to geographical education in order to encourage colonial enterprise.

Education. **Blunt.**

General Intelligence Papers, with Exercises in English Composition. By Gerald

Blunt. London: A. M. Holden [1900]. Size 7½ × 5, pp. viii. and 122. *Price* 2*s*. *Presented by the Author.*

A collection of miscellaneous questions, a few touching on elementary geography, all easy for any schoolboy to ask, but some difficult for any one to answer.

Educational—Methods. *National G. Mag.* **11** (1900): 192–199. **Kelton.**

Apperception in Geography. By M. E. Kelton.

Presenting a scheme of geographical teaching in schools based on observation and the use of maps.

French Colonies. *National G. Mag.* **11** (1900): 225–238. **Bracq.**

The Colonial Expansion of France. By Prof. Jean C. Bracq. *With Map.*

A historical study of colonial policy in France.

French Colonies. **Lee.**

French Colonies. Foreign Office, Miscellaneous, No. 520, 1900. Size 10 × 6, pp. 92. *Price* 5*d*.

This bulky report omits consideration of Tunis, which is under the French foreign office as a protected state, and also of Indo-China, the French possessions in India, St. Pierre, and Miquelon, on account of the small relative importance of their British trade.

French Colonies. **Monteil.**

Conférence de M. le Colonel Monteil sur le Domaine colonial de la France.—Congrès National des Sociétés Françaises de Géographie. XIX^e^. Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Pp. 181–191.

French Colonies. *Ann. G.* **9** (1900): 229–232. **Pelet.**

Un nouvel "Atlas des colonies françaises." Par P. Pelet. *With Map.*

Description by the compiler of a new French colonial atlas, illustrated by a specimen plate.

French Geographical Congress. ———

Société de Géographie de Marseille. Congrès National des Sociétés Françaises de Géographie. XIX^e^. Session—Marseille—Septembre 1898. Compte-rendu des Travaux du Congrès. Marseille, 1899. Size 10 × 6½, pp. 540. *Presented by the Société de Géographie, Marseilles.*

The papers of special importance are entered separately in the bibliography.

Geographical Year-book. **Wagner.**

Geographisches Jahrbuch. XXII. Band, 1899. Herausgegeben von Hermann Wagner. Zweite Hälfte. Gotha: Justus Perthes, 1900. Size 8½ × 6, pp. viii. and 245–472. *Price* 7 *mark* 50 *pf*.

This instalment contains a report on the progress of our knowledge of the distribution of animals since 1889, by Dr. A. E. Ortmann; and reports on recent works (1897–99) on Australia and Polynesia and on Africa, by Prof. F. Hahn; non-Russian Asia, by Dr. E. Tiessen; Latin America, by Prof. W. Sievers; North America, by Prof. B. Weigand; and a geographical Necrology for 1898–99, by Prof. W. Wolkenhauer.

Moravian Missions. ———

Periodical Accounts relating to the Moravian Missions. No. 41. Vol. iv. March, 1900. London. Size 8½ × 5½, pp. 233–292 and xxix–lii. *Map. Price* 4*d*.

Mountaineering. **Whymper.**

A Letter addressed to the Members of the Alpine Club. London, 1900. Printed for Private Circulation. Size 8½ × 6, pp. 16. *Illustration. Presented by the Author.*

Place-names. *P.S. Biblical Archæology* **22** (1900): 120–121. **Offord.**

Note on the Geography of Phœnician Inscriptions. By Joseph Offord.

This short note refers to evidence afforded by inscriptions to the effect that the ancient Phœnicians were in the habit of giving the names of places in their native country to similar features in their colonies.

Place-names. *Scottish G. Mag.* **16** (1900): 368–375. **Richardson.**

River Terminology. By Ralph Richardson.

The title is misleading, as the paper deals with nomenclature, not terminology. The author discusses the origin of common river-names, showing the affinity between them and the various changes they have undergone.

Water-supplies. **Veeren.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **17** (1900): 234–272.

De beteekenis van de wateren der aarde als drinkwater. Door F. E. L. Veeren.

On the methods of water preservation and supply in all parts of the world.

NEW MAPS.

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England and Wales. **Ordnance Survey.**

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Miscellaneous:—County Diagram, Yorkshire (North Riding), printed in colours, 2 miles to 1 inch. 3*s.*

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Historical Atlas. **Poole.**

Historical Atlas of Modern Europe, from the Decline of the Roman Empire; comprising also maps of parts of Asia and of the New World connected with European History. Edited by Reginald Lane Poole, M.A., PH.D., Fellow of Magdalen College,

and Lecturer in Diplomatic in the University of Oxford. Part xxvi. Oxford: The Clarendon Press; London, Edinburgh, Glasgow, and New York: Henry Frowde, M.A.; Edinburgh: W. & A. K. Johnston. 1900. *Price* 3*s.* 6*d.* *Presented by the Clarendon Press.*

Twenty-five parts of this atlas are now published out of the thirty which it will comprise altogether. This part contains map No. xvii., England and Wales in 1086; No. lxiv., Italy, circa 850–1067; No. lxxxii., the Ottoman Empire in Europe, 1356–1897. Each map is accompanied by descriptive letterpress, that for the first-mentioned map being by Prof. James Tait, M.A.; the second by Miss Lina Eckenstein; and the third by Mr. W. Millar, M.A. These notes are somewhat brief, but are, however, sufficient to explain the maps without attempting to give a complete history of the special periods and subjects dealt with.

ASIA.

China, etc. **Johnston.**

W. & A. K. Johnston's Map to illustrate the Chinese Question. Scale 1 : 6,198,300 or 97·8 stat. miles to an inch. W. & A. K. Johnston, Edinburgh and London, 1900. *Price* 1*s.* *Presented by the Publishers.*

This sheet of maps and plans will be useful to newspaper readers and others at the present time in assisting them to follow events that are taking place in the Far East. There are altogether fifteen maps and plans on the sheet.

China. **Kinder.**

Map showing the Imperial Railways of North China, and proposed extensions. Scale 1 : 1,350,000 or 21·4 stat. miles to an inch. C. W. Kinder, Engineer-in-Chief *Presented by the Author.*

China, Japan, and Korea. **Stanford.**

Stanford's Map of Eastern China, Japan, and Korea. Scale 1 : 6,969,600 or 110 stat. miles to an inch. London: E. Stanford, 1900. *Price* 3*s.* *Presented by the Publisher.*

Now that the attention of the public is so much occupied with matters in China, this map will no doubt prove useful for general reference. It would, however, have been more satisfactory if it had been drawn on a separate projection instead of being taken from a map embracing a much larger area, as unnecessary distortion would thus have been avoided. The limits of the territory recently leased to Great Britain to the north of Hongkong might also have been shown. In addition to the general map, there is an inset plan of the country around Peking.

AFRICA.

North-West Africa. **Stanford.**

Stanford's Map of Morocco, Algeria, Tunis, and parts of Tripoli, Senegal, and the Military Territories of the Western Sudan. Scale 1 : 5,977,382 or 94·3 stat. miles to an inch. London: E. Stanford, 1900. *Price* 3*s.* *Presented by the Publisher.*

This is the north-west part of Stanford's large map of Africa, published separately to illustrate recent boundary questions. The eastern boundary of Morocco as defined by the treaty of March 18, 1845, is laid down, together with the south-west boundary of that country, which is shown in conformity with the agreement concluded between the Vizier of Morocco and H.M. Minister at Tangier, March 13, 1895. The map is not quite up to date in some respects, but it will doubtless be useful, especially in connection with the disputed boundary between Algeria and Morocco.

South Africa. **Wood and Ortlepp.**

Map of the Northern Portion of the Transvaal, with parts of Bechuanaland, Rhodesia, and Portuguese East Africa. ("Briton or Boer") Northern extension. Scale 1 : 1,267,200 or 20 stat. miles to an inch. Wood and Ortlepp, Cape Town and Johannesburg, 1900. *Price* 7*s.* 6*d.*

In the *Geographical Journal* for May last, the southern portion of this map, which contained the Orange State, Natal, and adjacent territories, was noticed. The present sheet, on the same scale as the other, is an extension of the map to the north, and includes the northern part of the Transvaal, the southern portion of Rhodesia, Bechuanaland, and Portuguese East Africa. It cannot be said to compare altogether favourably with the southern sheet, and bears evidence of having been hurriedly produced. There are no projection lines, and the degrees of latitude and longitude are not indicated.

Transvaal. **Melvill.**

Map of the Vereeniging-Pretoria portion of the Transvaal. Sheets: Klip River, Johannesburg, Springs, Krugersdorp. Scale 1 : 59,500 or 1·06 inch to a mile.

E. H. V. Melvill, M.I.C.E., etc., Consolidated Gold Fields of South Africa, Cape Town. *Presented by E. H. V. Melvill, Esq., M.I.C.E.*

These sheets form part of a map of the Southern Transvaal, in the neighbourhood of Vereeniging and Pretoria, which is now being compiled for the Military Intelligence Department by Mr. E. H. V. Melvill, of the Consolidated Gold Fields of South Africa Survey Department. The scale is sufficiently large to make the map of real practical value to the troops in South Africa, and Mr. Melvill, who is himself well acquainted with the country, has doubtless made use of the best material at his disposal.

West Africa. **Moisel.**

Das Konzessionsgebiet der Gesellschaft Nord-west-Kamerun. Ausgeführt im Auftrage der Gesellschaft Nordwest-Kamerun zu Berlin. Bearbeitet von Max Moisel. Scale 1 : 500,000 or 7·8 stat. miles to an inch. Berlin, 1900. Kommissionsverlag von Dietrich Reimer (Ernst Vohsen). Four sheets. *Price* 12 *marks.*

All available information appears to have been utilized in the compilation of this map, which has been prepared for the society whose territory it especially represents. The whole area included extends from 3° 30′ to 9° 30′ N. lat., and from 8° 30′ to 13° 40′ E. long. The map is printed in colours, and shows travellers' routes, together with the dates of their journeys, while altitudes along the routes are given in metres. All government and military stations are underlined in red, and boundaries are indicated.

AMERICA.

Canada. **Surveyor-General's Office, Ottawa.**

Sectional Map of Canada. Scale 1 : 190,080 or 3 stat. miles to an inch. Sheet 21, Swan River. Surveyor-General's Office, Ottawa, 1900. *Presented by the Surveyor-General of Canada.*

AUSTRALIA.

West Australia. **Wells.**

Map showing the Route and Discoveries of the Calvert Exploring Expedition in Western Australia. Equipped by Albert F. Calvert, F.R.G.S., London. Commanded by L. A. Wells, of S.A. Survey Department, 1896–97. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Surveyor-General's Office, Adelaide, 1898. Two sheets. *Presented by the South Australian Branch of the Royal Geographical Society of Australasia.*

This map includes the portion of Western Australia extending from 17° to 28° 40′ S. lat., and 117° 40′ to 127° 20′ E. long. Previous to the expedition under Mr. Wells the region had been traversed by several explorers, but much of it remained unexplored. The earlier travellers, with the exception of the Hon. D. Carnegie, part of whose route is included in the north-east of the map, had all crossed the country in an east-and-west direction; but, as Mr. Wells travelled from south to north, his work is important as filling in the previously unexplored gaps between the earlier routes. In addition to the route followed by the expedition, the map gives numerous notes upon the character of the country, water obtainable, positions of places observed, etc. It is in two sheets, and has been prepared at the Surveyor-General's office, Adelaide.

GENERAL.

French Colonies. **Pelet.**

Atlas des Colonies Françaises. Dressé par ordre du Ministère des Colonies. Par Paul Pelet. Paris: Armand Colin & Cie. Livraison ii. *Price* 3 *fr.*

This is the second part of Pelet's 'Atlas des Colonies Françaises,' and contains the following maps: No. 8, Sénégal, scale 1 : 1,000,000, with a plan of the country round Timbuktu on the same scale. No. 11, the eastern sheet of a map of West Africa on the scale of 1 : 3,000,000, including the region between the great bend of the Niger on the north and the coast on the south, and extending from Cape Three Points on the west to the Niger delta on the east. The southern portion of Dahomey is also given on this sheet as an inset, on the scale of 1 : 1,000,000. No. 24 contains maps of the French possessions in the West Indies and the islands of St. Pierre and Miquelon, Newfoundland. It consists of a map of Guadeloupe, Martinique, etc., on the scale of 1 : 500,000, and five insets. The maps are very creditably produced in colours, and on those of Africa, travellers' routes are given in red.

PHOTOGRAPHS.

Central Asia. **Morse.**

Seventy-seven Photographs taken in Mongolia and Russian Central Asia, by Isidor Morse, Esq., 1899. *Presented by Isidor Morse, Esq.*

This is a set of little "Kodak" photographs taken by Mr. Isidor Morse during his travels in Central Asia last year. Although small, they are, generally speaking, remarkably clear, and as the following list of titles will show, some of the subjects are very interesting:—

(1) Framework of tent near river Tekes, Kulja; (2) Mongols; (3) Altai wapiti; (4-6) Mongols; (7) Muzart fort; (8) Two Mongols and Chinese cook; (9) Muzart fort; (10) Two Jesuit missionaries; (11) Mongol wedding; (12) Mongol officers; (13) River Ili; (14) Kurghiz, Kara Kul valley; (15) Carts loaded with coal from Chinese mines at Kulja; (16) Two Jesuit missionaries; (17) Fumigating luggage; (18) Kurghiz looking for game; (19) Crossing the river Ili; (20) Foot-hills of the river Tekes; (21) Fumigating luggage; (22) Courtyard of Armen; (23) Russian-Chinese frontier post; (24) Mongols; (25) Russian posting station near Issik-Kul; (26, 27) Ponies crossing river Tekes; (28) Russian family; (29) Fumigating luggage; (30) Mongol wedding; (31) Mongol ladies; (32) Courtyard, Armen; (32A) Well-to-do Kurghiz; (33) Head of the Kalmuk; (34) Hotel at Tashkent; (35) Kurghiz; (36) Crossing river Ili; (37) Russian-Chinese frontier post; (38) Russian posting station; (39) Tairtsas; (40) Roe deer heads; (41) Ibex heads; (42, 43) Altai wapiti heads; (44) Jirgalan; (45) Framework of tent; (46) Chinese servant and police; (47) Russian family; (48, 49) Shakirli; (50) Mongols; (51) Large ibex horns; (52) Chinese boy; (53) Kurghiz; (54) Sart cook; (55) Head of the Kalmuks; (56) Chinese soldiers; (57) Roe deer heads; (58) Mongol lady of rank; (59) Mongol; (60) Roe deer; (61) Chinese boy; (62) Tranchi; (63) Chinese cook; (64) Mongol officer; (65–77) no titles.

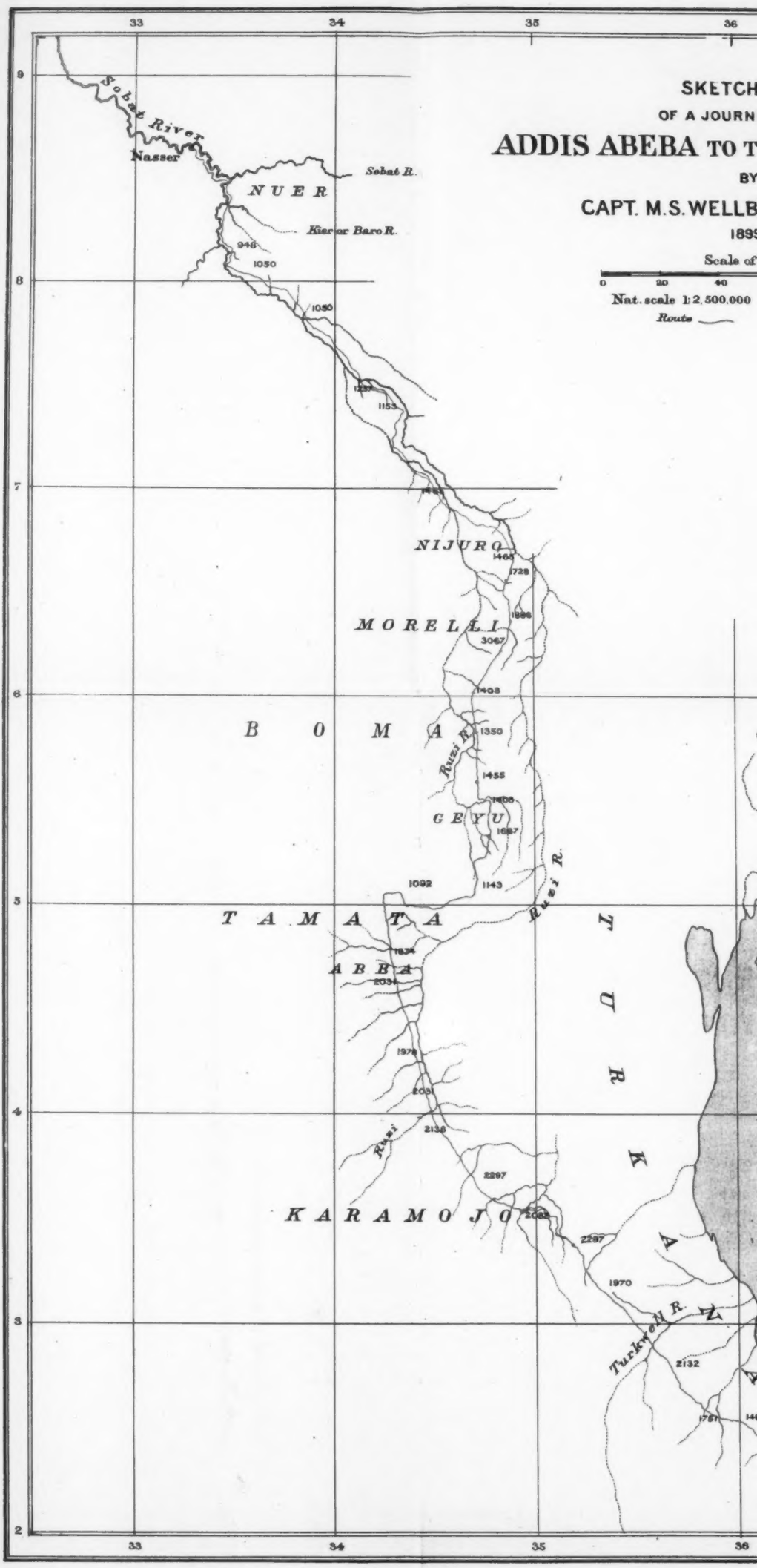
Transcaucasia. **Gulbentian.**

Forty-seven Photographs taken in the neighbourhood of the Aras and Kur rivers, Transcaucasia, by C. S. Gulbentian, Esq., 1900. *Presented by C. S. Gulbentian, Esq.*

As will be seen from the following list, these photographs represent the character of the country and mines in the neighbourhood of the river Aras, which constitutes the boundary between Russian Transcaucasia and Persia.

(1) Melik-Azariantz mines at Katar; (2) Valley and river behind Katar Company's old disused refinery; (3) Forest around Shakus; (4) River at Kodghanna; (5) Valley 4 miles from Sharafan; (6) Old bridge at Kuduferin; (7) Old bridge of Kuduferin in distance; (8) New bridge at Kuduferin; (9) River at Koatanla; (10) Specimen of shallows; (11) Main arm of Aras near Maralan; (12) River near Maralan; (13) Russian frontier guards at a river crossing; (14) Aras near Altan; (15) River above Karaduliski; (16) Aras near Karadule-Bazar; (17) River below Karadule-Bazar; (18) Aras, 40 miles above junction with Kur; (19) Mill on Aras 20 miles above junction with Kur; (20) Junction of Aras and Kur at Petropaulskai; (21) River Kur; (22) Kur below Petropaulskai; (23) Forest-clad hills near Katar, with Persian mountains in distance; (24) Hill and dale about 20 miles from Katar; (25) A typical vein outcrop, with young Azarianz, Vahanian, and Kondouroff; (26) Usine de Kondouroff; (27) Usine de Katar; (28) View from the Usine de Katar, showing snow mountains; (29) Hills of Barabatum; (30) Forest of Bartaz; (31) Village of Megri on the Aras, 30 miles from Sunik; (32) The Aras near Megri; (33) Katar; (34) Bashkent and group of miners; (35) Kavart; (36) Kavart, showing quartz rock; (37) The mines of Galizoar; (38) General view of the Copper Hill from the south; (39) General view from high hill above Bashkent, showing Copper range and country; (40) The valley of the brook Kavart from one of the Lazareff dumps; (41) The lower reach of the Okti chai; (42) Russian Cossack outpost on the Aras; (43, 44) The Aras just below the mouth of the Okti chai; (45) Zanzezur hills and mountains from the Guiyan steppe; (46) Usine de Sunik; (47) Usine de Sunik, showing the valley surrounding it.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



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Heights in feet.

Scale of Miles
0 20 40 60 80 100
1,000 or 39·45 miles = 1 inch.

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